An analysis of ICT policy development and practice in teacher education in Kenya between 1997-2007

Thesis

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AN ANALYSIS OF ICT POLICY DEVELOPMENT AND PRACTICE IN TEACHER EDUCATION IN KENYA BETWEEN 1997 AND 2007

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DEDICATION

To my children

Ricky, Tonny and Amy

for the inspiration that you are in my life

Quote:

'Writing about such a fast changing industry [ICT] is like taking a photograph of a busy highway; the scene on the highway will never be the same as in the photograph.'

Crowther Pepela (2004)

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ABSTRACT

This study, entitled 'An analysis of ICT policy development and practice in teacher education in Kenya between 1997 and 2007', is a qualitative study that uses a historical interpretive approach involving documentary analysis, interviews and case studies, to document the evolution of ICT policies relevant to teacher education in post independence Kenya, and explore the practices among teachers and teacher educators with ICT between 1997 and 2007. It examines the policy-practice relationship in the context of teacher education. The thesis draws from the work of Elmore and also Fullan to understand the change process with educational ICT policies. Not much research has been done in this area in Kenya and this study is therefore a useful contribution to the body of knowledge on ICT policy development and practice in teacher education in developing country contexts.

The ICT policy process for teacher education in Kenya takes place in a 4-Tier framework that involves international organisations at Tier 1, the Ministry of Education, other ministries and associated bodies at Tier 2, private or public sector organisations at Tier 3, and pre-service and in-service teacher education programmes at Tier 4. There is lack of co-ordination within and between these Tiers, which results in varied practices that portray differential understandings and interpretations of policy in regard to the place of ICT in teacher education.

Despite the exposure to ICT training programmes, availability of computers in various institutions and in some instances, a national ICT curriculum, teacher educators' and teachers' practices in subject teaching do not reflect the policy provisions on ICT pedagogic practice. The national ICT policy, therefore, is hyperationalised and not necessarily policy in action as seen in the Case programmes. The policy discourse disjunction and stratification in the 4-Tier ICT policy development and implementation framework is responsible for the slow pace of change in training and teaching practices in Kenya. This thesis proposes that teacher needs and competencies with ICT should be identified in a backward mapping approach. This will ensure transformative practices in teaching and teacher education, reduce the occurrence of hyperationalisation and allow for consensus building regarding the place of ICT in teacher education programmes and teaching in Kenya.

DECLARATION

This is to certify that this thesis comprises only my original work towards the PhD and that due acknowledgement has been made in the text to all other material used.

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ABBREVIATIONS

3G	Third-Generation cell-phone technology
CCK	Communications Commission of Kenya
CFSK	Computers for Schools Kenya
COMESA	Common Market for East and Southern Africa
DTTC	Diploma Teacher Training College
EDGE	Enhanced Data for GSM Evolution
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication
ICT	Information and Communications Technology
IMF	International Monetary Fund
ITU	International Telecommunications Union
KAPE	Kenya African Primary Examination
KBC	Kenya Broadcasting Corporation
KENET	Kenya Education Network Trust
KESSP	Kenya Education Sector Support Programme
KIE	Kenya Institute of Education
KIPPRA	Kenya Institute of Public Policy Research and Analysis
KNEC	Kenya National Examinations Council
MOE	Ministry of Education
NEPAD	New Partnership for Africa's Development
NGO	Non Governmental Organisation
PTE	Primary Teacher Education
PTTC	Primary Teacher Training College
SAGA	Semi Autonomous Government Agency
SMASSE	Strengthening of Mathematics and Science in Secondary Education
TIQET	Totally Integrated Quality Education and Training
TSC	Teachers' Service Commission
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UPE	Universal Primary Education
VOK	Voice of Kenya
VSAT	Very Small Aperture Terminal

INTRODUCTION

The format of this thesis

This thesis has an introduction and 9 chapters. The Introduction gives a broad justification of the study. Following this section detailing the format of the thesis, I give the rationale for the study, outline the research questions and sub-questions, and the scope and significance of the study. I then give an elaboration of my position as a researcher in the context of my study. Since Information and Communications Technology (ICT) is a dynamic and, in the current understanding, relatively new field in the Kenyan education context, I further give definitions and explanations of concepts and terminologies that are of relevance to the study.

In Chapter 1, I provide a background and context of the study, looking closely at ICT in Africa and the formal education policy making structures in Kenya. I also describe the teacher education system in Kenya. I present a review of perspectives from the research literature in Chapters 2 and 3. These two chapters situate my study within the theoretical and research trends in the policy development and implementation process, and also ICT policy implementation in education in Africa and globally. In Chapter 4, I begin by presenting an overview of the research methodology. I describe my use of the historical interpretive approach in the context of qualitative research, and also highlight the data collection process through documentary analysis, interviews with key stakeholders and a 3-case multiple case study. I then describe my data analysis process. In Chapter 5, I carry out a chronological analysis of the evolution of ICT policies of relevance to teacher education in Kenya. I present the findings drawn from

interviews with key stakeholders and the case study in Chapters 6 and 7. I then carry out an analysis and discussion of my findings in Chapter 8, make some general conclusions regarding the contributions of the study to research, and give some suggestions for further research in Chapter 9.

Rationale for the research

The existence of a sustained rhetoric around the harnessing of ICT to the needs of education in the global south has been noted in the research literature (Farrell and Isaacs, 2007; Leach, et al 2004; SchoolNetAfrica, 2004). Assertions that information, knowledge and communications networks have an important role to play in reducing poverty have been made by individuals, international agencies and governments (Zembylas, 2009; Etta, 2005;UNESCO, 2003; UNESCO, 2002).

The significant role played by teachers in implementing educational policies has been researched and documented in a number of studies (Harvey and Kamvounias, 2008; Hill, 2005; Bowe and Ball, 1992; Fullan, 1989). Studies on teacher education in Africa underscore the importance of a good teacher education system (Kafu, 2011; Lucas, 1968). However, some sources suggest that research and evaluation records on the use of ICT in developing country contexts for teacher education is sparse. This is particularly true of investigations into the use of the more recent distributed, flexible and mobile technologies in the African context (Farrell and Isaacs, 2007; Traxler, 2007; Leach, et al 2004; SchoolNetAfrica, 2004), which is included in this study.

In Kenya, the government has made a number of efforts towards improving teaching using technology by putting in place an ICT policy framework and implementation strategy, complete with measurable outcomes and time frames (Farrell and Isaacs, 2007). My preliminary discussions with officers at the Ministry of Education, however, indicated that there did not exist an explicit national policy document on teacher education, and that instead, teacher education policies have been articulated in a number of different national educational policy and related documents. The first policy document that explicitly addressed ICT in teacher education was published in the year 2005. The *Sessional Paper No 1 of 2005 on a Framework for Education, Training and Research* covered a range of aspects of education, with two sections specifically dedicated to teacher development and ICT.

Also providing a strong rationale for my study were two points that emerged from an ICT Scoping Study Report for the School Empowerment Programme (SEP) in Kenya, which I co-authored in 2004. The first point was the absence of any government-led policy guidelines on the training of teachers on pedagogical use of ICT and deployment of teachers of ICT:

> There is only one teacher training establishment in Kenya that is specifically training ICT teachers – and none that is offering specific training in the application of ICT to pedagogy or the development of ICT-based pedagogical resource materials. Furthermore, the Teachers' Service Commission (TSC) , the teacher employment agency, has not specifically defined a standard for ICT teachers, and a dedicated Inspectorate for ICT (the primary quality control agent) was only recently established within the MoEST(p52).

Another finding in the same study indicated that there was no major project underway to develop materials to support teachers in the use of ICT across the curriculum, and the result was that computers in schools were used mainly to

teach computing skills, as well as for administrative purposes and 'their potential use in all other subject areas is hardly realised at all' (p53).

Stakeholders quoted in the study (like managers at Computers for Schools Kenya – CFSK) indicate that getting computers into the schools was considered the relatively easy part and that 'the big challenge was to build capacity so that the machines are effectively used in schools' (p53). It was apparent that there was a lack of policy guidelines on ICT in teacher education and also in education in general, and where there were guidelines, they were unclear to the teachers.

The teacher education programmes in Kenya have, therefore, been taking place against a backdrop of non-existent, inadequate or dispersed policy guidelines both for ICT in education in general and teacher education in particular. There is need to explore how ICT policies related to teacher education have evolved, and document them. It is also necessary to establish the current practices in teacher education programmes and explore some of the factors, besides policy, that might be responsible for these practices (Barret, 2004; Elmore, 1979). This will yield findings that will reflect an evolving understanding of the place of ICT in teacher education in Kenya.

It is against this background that my study sets out to explore the characteristics of the ICT policies in Kenya between 1997 and 2007. In order to understand the background to the policy environment in the period under study, the study investigates and documents the milestones in the national ICT policy making process in Kenya since independence to the year 2007. This way, the study aims at determining the sites of ICT policy making for teacher education in Kenya and possible influences on development of ICT policy in teacher education in Kenya.

Also of significance is my attempt to give an in-depth analysis of a process that has remained largely undocumented; this study will attempt to establish the evolving practice with ICT in relation to teacher education technologies, teacher education curriculum, actual classroom practice and other related components in the teacher education process. I will then outline challenges to policy development and implementation in relation to ICT in teacher education, and make suggestions on how these can be addressed in future policy making for ICT in teacher education.

My search for literature in this area has not revealed any previous research on ICT policy development and practice in teacher education in Kenya and therefore there is need to provide some empirical insights drawn from a systematic study on the possible influences on ICT use in teacher education and teaching in Kenya, which will be of relevance to many other developing country contexts.

Finally, my attempt to examine the status of teacher education programmes with regard to implementation of ICT is also inspired by the need to make a contribution to the research discourse in a subject area that no longer draws as much attention as the other sectors of education in Kenya, as it used to do in the period between 1847 – the 1970s. Observations to this effect have been made by some sources:

> Teacher education was a respected component of education [in Kenya]...The society felt that the future of Kenya lay in this programme of education...But with time, society no longer regards teacher education highly compared to other sectors of education (Kafu, 2011: p46).

This diminishing attention paid to teacher education inspires me to find some answers as to the sites of policy making for teacher education, particularly with regard to development and implementation of ICT policies in teacher education.

Research question and sub-questions

To help achieve the objectives of the study, the following research question and sub-questions will guide the study:

Research Question

To what extent have national ICT policies influenced policy and practice in teacher education in Kenya?

Research sub-questions

The following are the research sub-questions that will guide the study:

1. What are the characteristics of Kenyan national ICT policies in the post-independence Kenya?

2. Which specific aspects of ICT policies and education policies address ICT in teacher education?

3. What practices with ICT are evident in teacher education programmes between 1997 and 2007, and what range of factors give rise to them?

4. What are the implications of the evidence gathered for future ICT policy development and implementation for teacher education in Kenya?

Scope and significance of the study

The study period, 1997 to 2007, falls at a time when Kenya, just like the rest of the globe, witnessed a global 'electronics burst' as Personal Computers (PCs) were

just emerging in Kenya, and a new industry - the 'Information Technology' (IT) industry, referred to by some as 'informatics' - was fast evolving (Ochuodho and Matunga, 2005). In the late 1990s, many developing countries including Kenya, were re-positioning themselves to transform to knowledge-based economies in line with the global trends at the time.

This study period, 1997 – 2007, represents an era during which major milestones had been registered in ICT policy development in Kenya, key of which was the introduction of Computer Studies as a teaching subject in the secondary school curriculum and the establishment of the Communications Commission of Kenya (CCK). It is during this period that there were many other attempts by the Government of Kenya, institutions of higher learning, Non Governmental Organisations, teacher education colleges and other initiatives to come up with ICT driven educational initiatives, teacher education programmes and policies to guide these (Farrell, 2007; MoEST, 2004).

In the subsequent chapters, I have carried out a documentary analysis to obtain data from national and institutional ICT policy documents, strategy papers and related publications on policy development and implementation in Kenya. Through key informant interviews, information was sought from individuals who had been involved in various ways in the development and implementation of ICTs in teacher education in Kenya. The study also involved the conduct of a 3-case multiple case study where I undertook an in-depth look at practices in teacher education programmes involving ICT. This enabled me to uncover the actual experiences of various teachers with the curricula of specific teacher education programmes, technologies, and the teachers' perspectives on the extent to which their own training in ICT may have changed their classroom practice.

The significance of this study lies in the fact that it will yield a critical empirical analysis and documentation of policies and practices related to ICTs in teacher education in Kenya, and the factors, besides policy, that influence practice in ICTs in teacher education. This study will be an informative record of the link between ICT policies and practices in teacher education, and will be useful in guiding policy makers, researchers, curriculum developers, teachers and teacher educators when designing and implementing pre-service, in-service and professional development programmes for teachers in Kenya and other developing country contexts.

My position as a researcher in the Kenyan context

I have taught in secondary schools in Kenya since 1993. My teaching subjects at the time of my first appointment were English Language and Literature in English. However, after I undertook a Master of Science degree in Computer Based Information Systems (MSc, CBIS), which was a conversion course, I was redeployed to a secondary school by the Teachers' Service Commission (TSC) to teach English Language and Computer Studies. I subsequently had an opportunity to undertake my Master of Arts degree in Applied Linguistics (Language Teaching option) as a full time student at Lancaster University, UK. It is at this point that I had my earliest exposure to use of ICT in higher education. Upon return to Kenya, I was posted to a Primary Teacher Training College (PTTC, also commonly abbreviated as TTC) in 2004, where I was appointed the Head of ICT Department. Besides this responsibility, I continued to teach English and Computer Studies to pre-service teachers following the national curriculum.

Owing to my responsibility at the college as head of ICT Department and the perception of the Principal of the college that I had adequate prior exposure to and knowledge in ICT in education, I was nominated to join the ICT subject panel at the Kenya Institute of Education (KIE) that was tasked to develop a Teaching Guide for the Primary Teacher Education (PTE) ICT curriculum. Apart from participating as a resource person during these meetings, I specifically co-authored the section on ICT-pedagogy integration in this Teaching Guide. I then joined the Open University for my doctoral studies in 2006, before the ICT Teaching Guide that I participated in developing was sent to the colleges.

Four factors motivated my interest in the problem under study. First, I began to look critically at the primary teacher education curriculum and related teacher education issues, since I taught English and ICT at a PTTC in Kenya. Prior to 2004, I had taught at a secondary school and had no day-to-day exposure to the issues impacting upon the teacher education system in Kenya. I had worked at the PTTC for three years at the time I applied for a PhD at the Open University, UK.

Secondly, the ICT curriculum that I taught to the pre-service teachers at the PTTC was a national curriculum on ICT skills handed down to the college from the Kenya Institute of Education (Appendix 5). I had previously been exposed to ICT and pedagogy issues in two consultancies that I had undertaken for the Department for International Development (DFID) of the UK. I felt that the pre-service teachers seemed to require a larger knowledge base and more competencies than were factored into the ICT curriculum that I taught at the time. This curriculum limited my teaching in many ways as it did not allow me to explore or demonstrate how ICT would be useful as a tool and resource in teaching, for instance, English which was my other teaching subject.

Furthermore, I did not have the capacity to train these pre-service teachers on ICT-pedagogy issues in other subject areas. There was certainly a gap in my knowledge as a teacher educator and in the curriculum that needed to be explored. I was not certain of whose responsibility it was to interrogate the extent to which the ICT syllabus met the skills, competencies and attitudes required by myself as a teacher educator and also the pre-service teachers. This inspired me to examine, in my PhD, issues concerning the development and implementation of ICT curriculum in teacher education.

Thirdly, in spite of my previous exposure in ICTs in education and involvement in the national ICT curriculum development process at the KIE in the manner described above, the decisions on the ICT curriculum implementation at the college where I worked remained the prerogative of the college Principal. He did not consult me on issues of curriculum interpretation and implementation at the college. However, he often sought my opinion with regard to issues around specifications for additional computer hardware that he planned to buy, some computer peripherals or possible internet access options for the college. This inspired me to seek some possible answers to the reasons behind this tendency to prioritise investment in computer hardware, even when the pedagogical value of this equipment seemed unclear to the college leadership.

Finally, this study area was the natural next step after my MA dissertation, which was entitled *ICT and Language Pedagogy: Evaluation issues in ELT web sites.* One of the conclusions in this dissertation was that teacher preparation programmes needed to incorporate in their training curriculum broad criteria for evaluation of ICT-based English Language Teaching (ELT) resources such as web sites (Ogange, 2002). Faced with the ICT skills curriculum that I taught, I felt that

the opportunity had arisen for me to explore further the ICT content and practices in teacher education programmes, and examine where the content originated, giving the possibility of an understanding of how the curriculum development process could be improved and more relevant content incorporated, hence my focus on ICT policy development and practices in teacher education.

I used my personal involvement in the national ICT Scoping Study and in the development of the Teaching Guide to determine possible sources of data where necessary. I do, therefore, have some local and general knowledge and experience in ICT in teacher education that may not be consistent with the views of those in my immediate Kenyan context in the secondary school setting, the PTTCs and the institutions of higher learning. Of more importance is the fact that I brought my own story to bear on my study, particularly my previous exposure to research and implementation of ICT in certain aspects of education. I have expanded the scope of the study by attempting not to limit my study to the areas and institutions where I had worked or had other such interactions.

ICT: Definitions and concepts

In the last two decades, the value of Information and Communications Technology (ICT) has been widely recognised in society in general and education in particular. Today, schools, teacher education institutions and higher education establishments in both developed and developing countries regard ICT as a key component in their work (KENET, 2007). The knowledge-based economy and the post-industrial knowledge society require new skills regarding learning and knowledge processing, and ICT is generally

appreciated as a tool for fostering these skills in learners. Many countries now regard understanding ICT and mastering basic ICT skills as part of the core of education, equal in importance to literacy and numeric skills (UNESCO, 2002a).

In my search for relevant literature in this area, I did not encounter many sources that gave a particularly Kenyan or African understanding of ICT. I have therefore had to draw largely from the literature from non-African contexts to come up with an appropriate construction of various concepts in ICT. In this section therefore, I begin by giving my own definition of ICT, and proceed to discuss other definitions of terminology and concepts that have informed my definition in the context of education.

ICT terminology

Since my study is about policies for Information and Communications Technologies (ICTs) in teacher education, my definition attempts to capture the technological tools, and the teaching-learning processes that ICTs are likely to support. For the purposes of this study therefore, I have adopted the following definition of ICT:

> ICT is the combination of resources, tools and processes that variously support teaching and learning. The resources refer to knowledge to be learnt, tools refer to the technological innovations including old analogue and new digital technologies, while the processes define the communicative and interactive capabilities enabled by these technologies, especially through the Internet and other networked technologies. For the purposes of this research, ICT is also defined as those devices, converged or otherwise, used in addressing educational needs and problems, and facilitated by both old technologies like the radio, telephone, television and audio tapes; and the newer digitized forms including computers, Internet, mobile phones and other handheld devices.

This definition is drawn from and informed by the wide range of interpretations of aspects of ICT that exist in the literature, which range from the generic that classify ICTs into broad categories, to those that isolate specific elements of ICT and attempt to discuss these elements in the context of education.

Some definitions in the literature take a particular focus on ICT as a technological application that facilitates information processing. For instance, ICT has been defined as the combination of informatics technology with other related technologies, specifically communications technology. This definition sees ICT as a merger of two areas; 'informatics' and 'informatics technology' (UNESCO, 2002a). Informatics (or computer science) is defined as the science dealing with the design, realization, evaluation, use, and maintenance of information processing systems, including hardware, software, organizational and human aspects, and the industrial, commercial, governmental and political implications of these. Informatics technology, on the other hand, is described as the technological applications (artefacts) of informatics in society. In this context, communications technology such as the Internet would be seen as one such area of technological application.

Other definitions seem to focus on ICT as computers and peripherals. In some sources, ICT is seen to encompass the range of hardware like desktop and portable computers, projection technology, calculators, data-logging and digital recording equipment; software applications 'including generic software, multimedia resources, and information systems like the intranet and the Internet' (Hennessy et al, 2005: p155). Other studies consider ICT as an umbrella term that includes any communication device or application encompassing radio, television, cellular phones, computer and network hardware and software as well as the various

services and applications associated with them, such as videoconferencing and distance learning (TechTarget, 2007). ICT may include satellites, broadband communication and mobile phones capable of transmitting data (Leach and Moon, 2000).

These definitions of ICT as computers and peripherals has been seen to be narrow in some studies. Such studies add non-computer digital devices, including those that simulate electronic devices, to the definition. For instance, in their study, Plowman and Stephen (2005) use a broad definition of ICT that encompasses a variety of audio–visual resources, 'smart' toys, and everyday technologies, such as remote control devices, photocopiers, telephones, fax machines and televisions. They also include toys that simulate appliances such as mobile phones, laptops, cash registers, microwave ovens, and barcode readers as well as digital cameras, tape recorders, computers and their peripheral devices.

The term 'convergence', which is associated with both old and new technologies, is commonly used in reference to the combination of voice, data and video onto a single platform, and can therefore be said to occur when multiple ICT products form one product with the advantages of all of them. Peters (2007) argues that these previously separate forms of ICT create new efficiencies when they combine since they share resources and interact with each other.

Where the focus is on the curriculum, the definition of ICT has tended to focus on the tools and techniques used in delivering learning. It has been defined as:

> ...the range of tools and techniques relating to computer-based hardware and software, to communication including both directed and broadcast, to information sources such as CD-ROM and the internet, and to associated technologies such as robots, video-conferencing and digital TV (Tanner, 2003: p 4).

Whereas some studies have used the terms 'ICT' and 'IT' (Information Technology) interchangeably, others have attempted to draw a line between them. Where the term 'ICT' is used, it defines a set of tools used to process and communicate information. The term 'IT' is more commonly used in the international business world to refer to a set of computer based systems for gathering, processing, storing and communication management of relevant data and information (Vickery, 2002; Tanner, 2003).

Other definitions of ICT in the education context that appreciate this difference refer to ICT as 'the computing and communications facilities and features that variously support teaching, learning and a range of activities in education' (Kent ICT, 2009)[1]. In this definition, the focus is on the subject being taught or studied rather than developing pupils' skills with, and knowledge of, the technologies themselves.

IT, on the other hand, would comprise the knowledge, skills and understanding needed to employ information and communications technologies appropriately, securely and fruitfully in learning, employment and everyday life. The knowledge base expected of an IT capable student would therefore include an understanding of how information is structured in a database and skills that are relevant in carrying out a search on the World Wide Web or an understanding of how computers simulate processes (Kent ICT, 2009). The focus of IT is therefore on the learner's capability with ICT.

[1] Such ICT-related activities would include the use of: broadcast material or CD-ROM as sources of information in history; micro-computers with appropriate keyboards and other devices to teach literacy and writing; keyboards, effects and sequencers in music teaching; devices to facilitate communication for pupils with special needs; electronic toys to develop spatial awareness and psycho-motor control; email to support collaborative writing and sharing of resources; video-conferencing to support the teaching of modern foreign languages; internet-based research to support geographical enquiry; integrated learning systems (ILS) to teach basic numeracy; communications technology to exchange administrative and assessment data.

From the aforegoing, three dimensions emerge of ICT and its use in educational contexts. It may be viewed as 'a *key skill* which, like literacy and numeracy, underpins learning in a range of subject areas; *a resource* which should be used to support and extend the nature of teaching and learning across the curriculum; and *a discipline* in its own right...with its own characteristic forms of knowledge, skill and understanding' (Kennewell et al, 2000: p8-9). Other definitions of ICT look at IT as a variant of ICT, blurring this dividing line even further. Dillon (2004) has defined ICT as 'educational computing and its variants – the information technology (IT), Information and Communications Technology (ICT), educational multimedia and telematics in education' (p138). Dillon however asserts that the locus of ICT inquiry in studies on ICT in education has mainly been the computer.

Definitions of state-of-the-art instruction usually mention the most recently developed tools and the current focus on computers and the Internet does reflect the tendency of research to place emphasis on technology that is considered current at the time (Roblyer and Edwards, 2000). Studies in the field of ICT in education, which is referred to in some literature as 'educational technology' increasingly refer to the current and potential impacts of the computer and the Internet in education (Kriger, 2001). It is therefore not surprising that a history of technology in education between 1920 and the 1980s places the emphasis on radio and television, with computers as an afterthought (Cuban, 1986).

Whereas Seattler (1990) argues that educational technology immediately brings to mind the use of some device or a set of equipment, particularly computer equipment, other researchers stretch the definition beyond this to focus on technology tools as an overlapping combination of media, instructional systems and computer based support systems (Roblyer and Edwards, 2000). These

authors emphasise a subset of all these resources, focusing primarily on computers and their role in instructional systems. They justify the focus on computers thus:

> Computers as media are more complex and more capable than other media such as film or overheads. Again, computer systems are currently moving towards subsuming all other media within their own resources. For instance, presentation software can generate overhead transparencies. Lastly, computers and computer-based systems are not very easy to integrate into other traditional classroom activities (p8).

Computer technology in itself, therefore, is not significant and should be defined in a pedagogical context. Salomon et al. (1991) share this view when they point out:

> Although our attention is focused on computer technology, we are fully aware that computer technology, in and of itself, is of little interest. What is of interest are the kinds of programmes and tools that can be used with this technology, as well as the kinds of activities that they afford [in an educational setting] (p2).

They argue that the term 'computer technology' is used only for the sake of brevity and that the real focus is primarily on computer tools and programmes which enable the process of learning.

The historical function of educational technology has been seen to be a process rather than a product, and no matter how sophisticated the media of instruction may become, a distinction should always be made between 'the process of developing a technology of education and the use of certain products or media within a particular technology of instruction' (Muffoletto,1994: p24). This view presents technology not as a collection of devices but a way of acting or doing things.

Other concurrent views see technology in education as a combination of these processes and tools involved in addressing educational needs and problems, with an emphasis on applying 'the most current tools; computers and their related

technologies' (Roblyer and Edwards, 2000: p6). In some literature, these current tools are referred to as 'new technologies' and the definition goes beyond computers to include the internet and networked technologies (Peters, 2007; Shih and Mills, 2007; Hamelink, 1997).

Despite the variations in definitions of terms and understandings of concepts, a growing consensus seems to emerge: that a definition of ICT should include information technologies, telecommunication technologies, and networking technologies. My definition of ICT therefore not only covers the concepts in the research literature, but also captures the ICT technologies and processes I anticipate to encounter in my analysis of ICT policies of relevance to education in general and teacher education in particular.

Whereas the use of analogue forms of ICTs like the radio, TV, audio tapes and analogue videos has been common in the education sector in Kenya (Odera, 2006), the use of the more current technologies like the Internet, computers, mobile and other digital technologies is only at its formative stages. My study will therefore focus on policies covering the entire range of technologies that are in use in the education sector including radio, TV, computer, mobile technologies and the Internet. The study recognises that the convergence of technologies may necessitate focus on policies, if any, around the use of other handheld devices that combine more than one technology. In this study therefore, the focus will remain on policies around ICTs as laid out in the definition at the beginning of this sub-section.

This study on policies of relevance to ICTs in teacher education in Kenya will take into account the application of both the older analogue technologies as well as the

newer digital and converged technologies in teacher education and the larger education context.

CHAPTER ONE: THE CONTEXT OF THE STUDY

1.1. Information and Communications Technologies in Africa

Many, including leaders in Africa, view Information and Communication Technologies (ICTs) as one of the most likely ways to fight ignorance, improve education systems and break the poverty cycle in developing contexts like Africa. Upon his release from prison in Roben Island 26 years ago, Nelson Mandela did marvel at the manner in which the changes in travel, communication and mass media had accelerated and brought with it the potential to improve governance, expand education and foster economic empowerment in a globalised world:

> What struck me so forcefully was how small the planet had become during my decades in prison; it was amazing to me that a teenage Innuit living at the roof of the world could watch the release of a political prisoner on the Southern tip of Africa. [ICT] had shrunk the world; and had in the process become a great weapon for eradicating ignorance and promoting democracy (Mandela, 1994: p558).

Owing to the predominantly weak economy, high poverty rates and perennial unemployment, the implementation and use of ICTs in various sectors in Africa might be seen as a secondary problem that does not need immediate attention in the face of more urgent issues. However, the potential of ICTs to promote development and transform the economies of developing countries has been noted in a number of sources (Zembylas, 2009; UNESCO, 2003; Etta, 2005).

The link between education, ICTs and knowledge for developing countries was also highlighted by Kofi Annan, while he was the Secretary General of the United Nations. In his address at the Global Knowledge Conference of 1997, he argued

that ICTs had great potential for developing countries, and in furthering sustainable development at all levels of the education sector:

> Knowledge is power. Information is liberating. Education is the premise of progress, in every society, in every family...[There is need for] greater, freer and fairer access to information for developing countries, through infrastructure improvement and technological advances; ...[and] innovative approaches to education and learning at all levels, understanding the cultural contexts in order to ensure the greatest achievement of knowledge (Annan, 1997: p1).

There are others who also argue that ICT is a means of promoting social justice and therefore emphasise the need for governments to examine not only who has access to ICT in education but also how ICTs can be used to promote a fair and just education for all learners in Africa (Vrasidas, Zemblyas and Glass, 2009). This potential of ICT in education to eradicate poverty has been seen as an important component of 'Education for development' since ICTs are seen as, among other things, instruments of social transformation in developing contexts (Kellner, 2004). One way to achieve this social transformation is to put in place technologies, pedagogies and educational policies that improve the quality of learning and life opportunities of typically marginalised students to eradicate socio-economic disadvantage (Cochran-Smith, 2004).

The countries in Sub Saharan Africa have not fully benefited from the technological revolution brought about by ICTs owing to infrastructural disadvantages. Access to a reliable supply of electricity is a general problem in many parts of Africa and is particularly severe in rural areas because of the difficulty of and expenses involved in connecting to national electricity grids. In a study conducted in an attempt to understand the dynamics of adoption and use of new technology in higher education in Kenya and Nigeria, capacity constraints

were noted to be largely a result of, among other things, thin bandwidth and frequent power outages (Oyelaran-Oyeyinka and Adeya, 2002).

Also, there is a general lack of human resource capacity to provide ICT training and equipment servicing. In addition, a lag exists between the availability of ICT infrastructure and the ability of agrarian societies in Africa to integrate it to benefit national development (Farrell and Isaacs, 2007). This affects the pace of widespread installation of ICT in education in Sub Saharan Africa as noted below:

> In addition to the poor infrastructural facilities, the costs of hardware and software plus those of maintenance and teacher and technician training are likely to be prohibitive for these countries. Education budgets are usually very low, and the scarcity or non-existence of more traditional educational facilities and equipment in many areas often makes suggestions for introducing the sophisticated new technologies into the education system or into grassroots communities seem a denial of reality (Byron and Gagliardi, 2002: p1).

By the turn of the century, research showed that all the countries in Africa combined had an average telephone density that was in order of magnitude smaller than that of the European Community with the number of telephones per 1000 persons ranging from 12 to 50 (Byron and Gagliardi, 2002). This picture is, however, changing rapidly and Africa now has the fastest growth of mobile phone connectivity in the world, with improved access even in the rural areas (Farrell and Isaacs, 2007). An authoritative website on Internet usage statistics places the 2011 Internet usage figures in Africa at 5.6% of the world total (Internet World Stats, 2011). Other sources have predicted that the next few years are likely to witness significant changes in Africa as fibre optic cables are laid, wireless internet begins to converge with expanding mobile phone capabilities, and the expansion of mobile phone usage continues rapidly (Africa Focus, 2009).

In particular, Kenya has registered a considerable growth in mobile teledensity[2] over the years as fixed line teledensity has continued to decrease alongside calling rates. According to the latest figures published by the industry regulator in Information and Communications Technology, Communications Commission of Kenya (CCK) on their web site in December 2010, Kenya's teledensity currently stands at 52.5% (CCK, 2010). The number of mobile subscribers stood at about 19.9 million by December 2009 out of a population of about 38.6 million people as presented in the 2010 Kenya Census Report (Mutahi, 2010).

Information on the CCK website in December 2010 suggests that Internet subscriptions increased by 33.6% to 2.7 million, up from 2 million. The increase was accelerated by the provision of mobile data GPRS (General Packet Radio Service), EDGE (Enhanced Data for GSM Evolution), and 3G (Third-Generation cell-phone technology) services, with mobile internet services comprising 99% of the total internet subscriber base.

With this kind of growth in ICT witnessed in Kenya and other parts of Africa, there has been renewed national and international interest in the development of policies to guide the cross-sectoral implementation of ICTs in various countries in Africa. One such Pan-African initiative formed to drive the ICT policy agenda across the sectors was the establishment of the NEPAD (New Partnership for Africa's Development) initiative in the year 2001. NEPAD was premised on the expectation that better government and greater economic sagacity would combine to make development possible (Chabal, 2002). A commission within NEPAD, the

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[2] Teledensity refers to the number of telephone lines (including wired residential and business lines) per 100 people, often used as a rough measure of the ubiquity of the public switched telephone network (PSTN) in a country. Teledensity can also generically describe the number of telephone lines per some unit of the population (often per 100 people) or the density of telephone lines in a community.

NEPAD e-Africa Commission, was tasked with the responsibility of running a broadband infrastructure programme whose aim was to connect all African countries to one another and, in turn, to the rest of the world through broadband fibre-optic submarine cables. The project expected that a broadband network that links all 54 African countries would provide abundant bandwidth, easier connectivity and reduced costs. This would in turn help to integrate the continent by facilitating trade, social, and cultural exchange between countries (e-Africa Commission, 2005).

It is against this context that I am looking at the use of ICTs in one sector, education, for one particular use – in teacher education. As recently as 2004, very few countries in the East African region had policies or strategies for use of ICT in teacher training although a number of web portals were beginning to be established (SchoolNetAfrica, 2004). My study looks at attempts to systematise the introduction of ICT in teacher education in Kenya through relevant policies. The study examines how ICT policies relevant to teacher education have been developed, and assesses the ways in which such policies have been received and interpreted in teacher education, in the context of other influences. This will be achieved through examination of specific policies and practices of relevance to ICT in teacher education programmes.

1.2. The formal educational policy making structures in Kenya

The primary sources of the general Kenyan law are the Constitution and Acts of Parliament. The Constitution is the 'supreme law of the land' and takes precedence over all other forms of law, written and unwritten. If any other law is inconsistent with it, the Constitution prevails, and the other law, to the extent of its inconsistency, is void. Ojienda and Aloo (2008) argue that many Acts of Parliament are made pursuant to particular provisions in the Constitution and most of the laws in Kenya emanate from an Act of Parliament.

These authors further assert that the Acts are introduced into Parliament by Members of Parliament (MPs) as Bills. The Bill then goes through certain stipulated stages within parliamentary procedures. If parliament approves of it after these procedures, the Bill is ready for Presidential assent, after which it becomes an Act of Parliament. The date of commencement of the Act is either the date it receives the Presidential assent, or a date shortly afterwards, or it can be brought into operation by order made by the appropriate Minister. Figure 1 below presents a simplified version of the legislation process in Kenya.

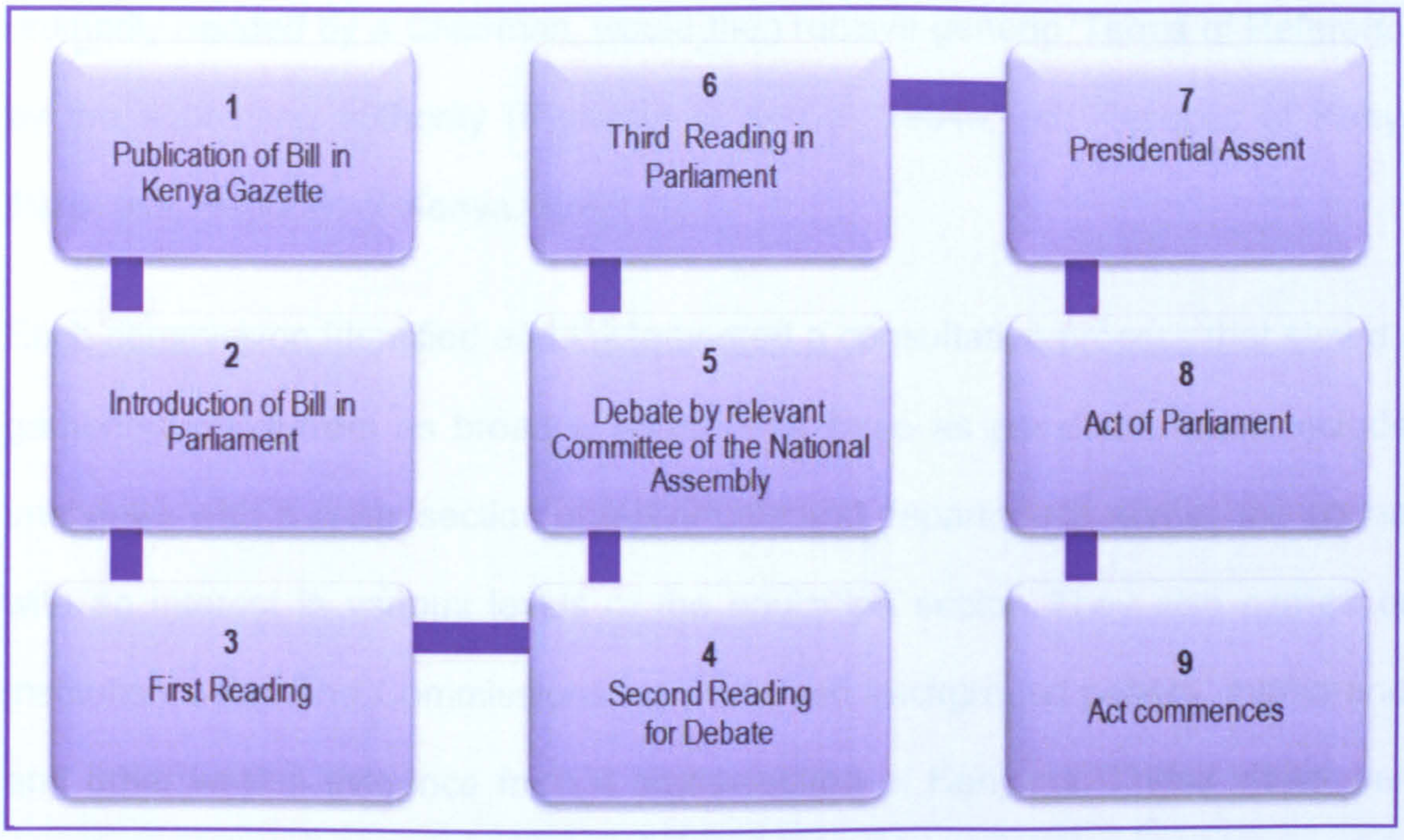

Figure 1: A simplified version of the legislative process in Kenya

Education and training in Kenya is governed by policies found in the Education Act (Republic of Kenya, 1968) and other related Acts of Parliament, including Teachers' Service Commission (TSC) Act of 1967, Kenya National Examinations Council (KNEC) Act of 1980 , Adult Education Act of 1966, Universities Act of 1985, and various Acts and Charters for universities. The policies are then implemented by different education and training institutions.

Besides official legislation, the Government of Kenya has also worked, since independence, towards addressing the challenges facing the entire education sector through commissions, committees, Presidential Working Parties and taskforces appointed by the government such as the Kenya Education Commission of 1964 and the National Committee on Educational Objectives and Policies of 1976.

The membership of these commissions and presidential working parties consist of nominees of the President or the Minister for Education. These commissions,

ordinarily headed by a Chairman, would then receive generic 'Terms of Reference' by the appointing authority (Republic of Kenya, 1964a: p5; Republic of Kenya, 1976: pvii; Republic of Kenya, 1988: pix).

Each commission identified and implemented a consultative process that aimed at gathering views from as broad a stakeholder base as possible. These included interviews with a cross-section of individuals and departments across the country with an interest in various levels of the education sector. They also carried out institution visits. The Commissions also received background papers, memoranda and other written evidence from a cross-section of Kenyans. These views were then, in each instance, collated into a report which then formed the basis for subsequent policy activity in the Ministry of Education.

Based on the recommendations of the commissions, working parties and taskforces, the government comes up with broad national objectives of education, which are then passed on to the Kenya Institute of Education (KIE) and translated into curricular for various courses in a process that involves participation by a Steering Committee, Course Panels and Subject Panels. The curriculum is then implemented in schools and teacher education institutions. The Kenya National Examinations Council (KNEC) and the Inspectorate at the Ministry of Education subsequently review this curriculum. Feedback from the implementing institutions is obtained through formative and summative evaluations carried out by KIE. The various roles of the committees and panels at KIE are summarised in Appendix 1, while the curriculum development process is presented in Figure 2 below.

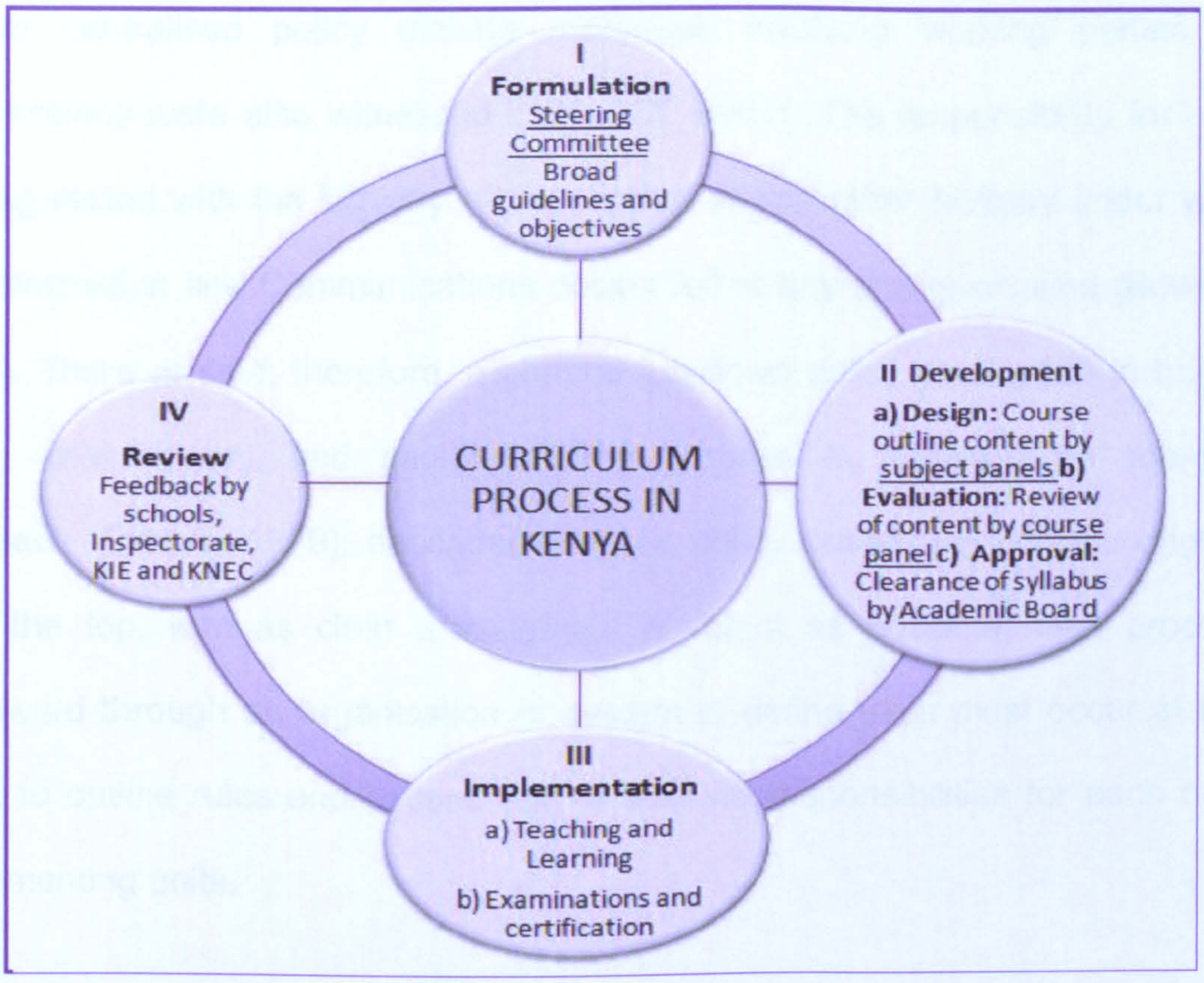

Figure 2: The Process of national curriculum development (Adapted from*: Republic of Kenya, 1988: p167*)

Another activity that has led to education policy development in Kenya was the National Conference on Education and Training held in November 2003. This conference, organized by the Ministry of Education, Science and Technology, brought together over 800 key players at various levels of the education sector. One key outcome of the conference was that it mandated the Ministry of Education, Science and Technology (MoEST) , under the stewardship of the Minister, to develop a new policy framework for the education sector based on the outcomes of the conference proceedings and various studies undertaken in the education sector (Republic of Kenya, 2005a: p1). This marked the beginning of the development of a key policy document *Sessional Paper No 1 of 2005 on A Policy Framework for Education, Training and Research*.

Similar centralised policy making processes involving working parties and commissions were also witnessed in the ICT sector. The responsibility for policy making rested with the Ministry of Information or any other Ministry under whom the Information and Communications docket fell at any one given time (Bowman, 2010). There existed, therefore, a general top-down policy conception in the ICT policy development and implementation process in Kenya. The top-down approach (Elmore, 1979), describes a public policy notion that policies originate from the top, with as clear a statement of intent as possible, then proceeds downward through an organisation or system to define what must occur at each level, to outline rules and actions and to allocate responsibilities for each of the implementing units.

Policy making is similar in the Ministry of Trade and Industry in Kenya. One study of the policy making process in this Ministry highlights the key role played by government ministries in policy making thus:

> ...policy processes in Kenya are shaped by the interaction between several international and domestic factors. The Ministry of Trade and Industry, while being the lead ministry in trade policy formulation and negotiations, is also charged with the responsibility of overseeing coordination and implementation issues across government (KIPPRA, 2007: p1).

Some sources have also documented presidential decrees as a common source of educational policy in Kenya. Over the years, decisions affecting various sectors of the nation have originated from 'one man [the President of Kenya] and his henchmen' (Amutabi, 2003: p130). This author adds that the education sector has generally been the worst hit by such decrees.

From this background, it would appear that the formal policy making process in Kenya is largely a centralised process where, often, national policies are regarded

as texts promulgated by the government through a Ministry (Samoff, 1999). The policies that address issues around ICT in teacher education would ordinarily be expected to originate from the government ministries or institutions and organs appointed by government. These policies originate from Acts of Parliament, sessional papers, reports of commissions and presidential working parties, and also outcomes of national conferences. An analysis of ICT policy evolution in teacher education in Kenya would need to take into consideration the provisions in the Acts of Parliament, sessional papers, reports of commissions and working parties, alongside other initiatives that are not necessarily supported by any formal documents. In Chapter 5 of this thesis, I have carried out an analysis of ICT policy evolution as evidenced in various policy documents such as these, as well as related publications and ICT initiatives in teacher education in Kenya.

1.3. Teacher education in Kenya

Background

Having been a colony of the British Empire as from the year 1885 when the partitioning of Africa took place, the entire education system in Kenya was, in the subsequent years, structured like the British education system, including the post-independence period. According to Tum (1996), the colonisation of Kenya had led to the introduction of the Western capitalist economic system, in which most of the instruments of production as well as objects of consumption were privately owned. The economy of the country was designed in a manner that allowed the colonialists to own most of the land, while the Africans provided cheap labour in the farms. The Fraser Report of 1909 had recommended the establishment of

separate education systems for Europeans, Asians and Africans. Consequently, an education system was tailored to cater for the intellectual development of the Europeans and Asians, thereby preparing the Europeans for leadership and Asians for the middle class roles that would emerge.

Tum (1996) observes that education was racially segregated, with Africans receiving technical training to provide the labour needed in the economy. Later, the government extended the curriculum for African education 'to inculcate an awareness on how to improve their village life and develop their local economic infrastructure' (p8). The primary school curriculum had been improved and teacher training was included as a course in the primary school curriculum to enable primary school graduates to teach in primary schools upon completion of that cycle of their schooling. There was an increase in the number of schools and in the student enrolment numbers both in primary and secondary schools in the immediate pre-independence period. There emerged, therefore, a need for trained teachers and a new curriculum to meet this demand:

> There is a large force of untrained primary teachers who must either be trained or phased out and replaced with trained teachers...Integrated approaches to rural development will increasingly demand changes in the role of teachers from one of classroom instructor to a more generally adaptable type of educator. This will require a new and coordinated approach to teacher education (Republic of Kenya, 1976: p106).

Kafu (2011) argues that the urge to establish teacher education in the early 20th Century was necessitated by the 'unplanned rapid expansion of the 'mission' and 'bush' schools, the latter being a reference to a number of secular schools that had sprung up at the time. This author says that this development called for an equally sharp increase in the supply of teachers to work in the newly established schools. Furthermore, there was need to produce school teachers to relieve missionaries

who were required to concentrate on evangelical work. The teacher-trainees in such schools were primary school leavers:

> The established 'mission' and 'bush' schools were primary schools (Classes B and A and Standards I – IV) and intermediate schools (Standards V-VIII). These institutions needed primary school teachers. Therefore, the designed teacher education programme catered mainly for primary school leavers from the level of Standard Three to Eight. This shows that most of the teacher trainees were of low academic qualifications although for that period, they were the most well educated individuals (Kafu, 2011: p45).

In the immediate post independence Kenya, a number of graduates of primary schools were employed as untrained teachers upon sitting the Kenya African Primary Examination (KAPE), offered then at the end of the primary cycle of the education system (Eshiwani, 1993). These teachers were deployed to teach in primary schools as Primary 3 (P3) teachers. They would subsequently undergo an in-service course that prepared them for the Kenya Junior Secondary Examination (KJSE), which was an exam sat in Harambee[3] schools at the end of Year 2 of the 4-year secondary cycle. Upon passing the KJSE, such teachers were deployed on a higher grade as Primary 2 teachers (P2) in primary schools, whereas the students in Harambee secondary schools who passed the examination joined Year 3 in government schools. The P2 teacher would then be admitted to PTTC to train as a P1 Teacher. Later on, in 1985, the KJSE was abolished as part of the recommendations made for educational reforms in the Mackay Report of 1981.

Some studies (e.g. Tum 1996; Karanja, 1995; Otiende, 1992;) suggest that after World War II in the 1940s, there was an increased demand for secondary education for Africans, and this led to the increased demand for teachers of a

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[3] *Harambee* is a Kiswahili term which literally means, 'lets pull together'. These were schools established in the post independence Kenya on communal participation basis through contributing finances and services. The schools were registered by the Ministry of Education and followed the national curriculum (Eshiwani,1993)

higher calibre than the primary school graduates. This led to the establishment of Makerere College in Uganda in the early 1940's to train diploma teachers for the entire East African region. The teacher education programme at Makerere College and other subsequent formal teacher education programmes were patterned on the established European and Canadian teacher education models of the early nineteenth century.

According to Karanja (1995), such teacher training programmes had been introduced in Kenya to a small scale in the mid-nineteenth century by European Christian Missionaries. Various characteristics of these initial teacher education programmes in the Western contexts were carried over to Kenya by the Missionaries, who largely played the role of teaching in the various institutions. Such characteristics included the organisation of teacher education programmes depending on the type of school the teachers were being prepared for and categories of teachers. Most countries in the western context had more than one category of teachers, depending on the education received and/or on the type of school in which s/he may be employed. Other characteristics included teacher training process (e.g. level, length and content of teacher education for each category of teacher), and qualifications (Metais,1991).

The teachers required to meet the needs arising from the rapid expansion of secondary education in the first decade after independence had been met by the expanded teacher training at various institutions in Kenya. Kenyatta College was established in 1965 while Kenya Science Teachers College was established in 1966 to train Secondary 1 (S1) teachers, which was a calibre of Diploma teachers. Around the same time, in 1966, the University of Nairobi, having been established in 1956 as the Royal Technical College, became a constituent college of the

University of East Africa. It was subsequently established as the University of Nairobi in 1970, thereby becoming Kenya's first University (Republic of Kenya, 1988).

The University of Nairobi started training Bachelor of Arts (BA) and Bachelor of Science (BSc) graduates who specialised in education. According to Kafu (2011), this qualification was later transformed into a professional Bachelor of Education (Bed) degree in 1970. Kenyatta University also began offering the professional BEd degrees in 1972. The Gachathi Report of 1976 recommended the retraining of serving teachers and training of untrained secondary school teachers to improve the quality of learning in secondary schools. The Kenya Technical Teachers College was set up in 1976 to train teachers at diploma level for technical subjects offered in secondary schools. The candidates were drawn from secondary school leavers (Republic of Kenya, 1976).

Current Structure

Initial teacher education in Kenya is currently undertaken by universities, Diploma Teacher Training Colleges (DTTCs) and Primary Teacher Training Colleges (PTTCs, also abbreviated as TTCs). Kenya has 7 public universities, several constituent colleges and a number of private universities that train teachers in various subjects. All student teachers in the universities are trained by various university Faculties of Education and these students qualify with Bachelors degree in Education, having majored in two teaching subjects besides the professional courses. A majority of student teachers in universities are drawn directly from graduates of the secondary schools. Lately, however, a significant number of pre-service teacher education students in the universities are graduates of the DTTCs

and PTTCs. On completion of their training, many of the graduates of the universities are deployed to teach in secondary schools. Others are also deployed to teach in the DTTCs and PTTCs.

Student teachers in DTTCs are graduates of secondary schools and also PTTCs. The graduates of the DTTCs major in two teaching subjects, besides the professional courses, and get deployed to teach in secondary schools. Some also get deployed to teach in primary schools whenever there is over-supply in their teaching subjects in secondary schools. PTTCs, on the other hand, offer a two-year national certificate course that prepares Primary 1 (P1) teachers who eventually get deployed to teach in primary schools.

There are a number of in-service teacher education programmes for teachers and teacher educators at various levels in Kenya. These are organised by the Ministry of Education, Non Governmental Organisations and other partners. Some in-service programmes, like that involving P3 teachers described above, were organised directly by the Ministry of Education and other partners to enable the largely untrained teaching force to be upgraded upon sitting a formal national examination. The in-service programmes also target teachers in public schools whose initial training was undertaken in the training institutions described above.

The Kenya Institute of Education (KIE) is a Semi Autonomous Government Agency (SAGA) within the Ministry of Education (MoE) that is responsible for designing the national curriculum and syllabuses for primary and secondary schools, and also teacher education institutions and other tertiary colleges below the university. These curricula are developed in close consultation with key stakeholders nationwide.

The education and training programme linkages depicting the teacher education path is represented in Figure 3 below:

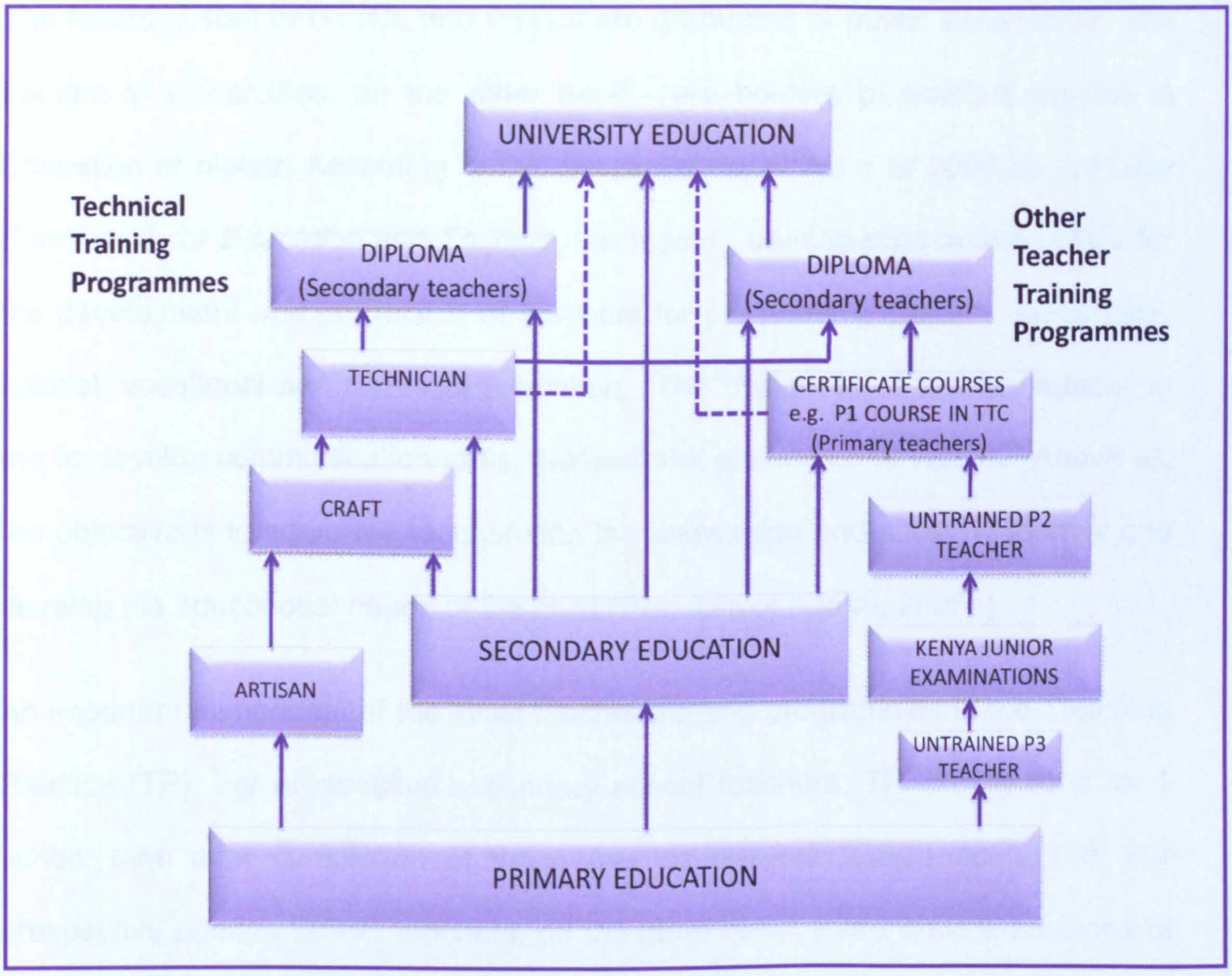

Figure 3: The education and training structure in Kenya (*Adapted from*: Republic of Kenya, 1988)

This figure depicts the path that the P3 teachers took to become professional teachers. It also shows that those who train as technicians have the option of taking teacher professional courses, and subsequently becoming professional teachers of the technical subjects that they have studied. This has some explanatory power on the role played by untrained technical staff in the roll out of ICT courses in secondary schools and PTTCs in Kenya, as will be discussed in the subsequent sections of this thesis. The dotted lines indicate the more recent

developments, where graduates of PTTCs and technical institutes gain direct entry to university degree courses.

The teaching staff in DTTCs and PTTCs are graduates of public universities. The trainers in universities, on the other hand, are holders of Masters degree in Education or higher. According to the *Sessional Paper No 1 of 2005 on A Policy Framework for Education and Training*, the teacher training programmes cater for the development and production of teachers for pre-primary, primary, secondary, special, vocational and technical education. The objectives of teacher education are to develop communication skills, professional attitudes and values. Above all, the objective is to equip the teacher with the knowledge and ability to identify and develop the educational needs of the child (Republic of Kenya, 2005a).

An important component of the initial teacher training programmes is the Teaching Practice (TP). For prospective secondary school teachers, TP usually runs for 1 school term after completion of the 4-year coursework (Ong'ondo, 2009). For prospective primary school teachers, on the other hand, three 4-week sessions of TP are undertaken – one inYear 1 and two in Year 2 (Republic of Kenya, 2004). Whereas the trainees for secondary school teaching are usually posted for TP anywhere in the country, those in PTTCs are posted in the primary schools that neighbour the institution where they train.

1.4. Conclusion

The key points arising from this chapter are as follows:

- That the use of ICTs is one of the ways in which countries in developing contexts such as Africa might improve access to and quality of education. The lack of ICT technological infrastructure, compounded by bandwidth challenges and difficulties in connecting to the national electricity grid, impede the adoption of ICT in the education sector at primary, secondary, tertiary and higher education levels in many settings in Africa

- That the formal education policy making structure in Kenya is a centralised, government led, top-down process, with stipulated implementation channels. Government policy in ICT in teacher education can be expected to be promulgated largely through Acts of Parliament, sessional papers and other such documents. The teacher education curriculum draws from the Kenyan law and also from the outcomes of the various commissions and working parties. This provides an indication of an analysis point with regard to the sites of policy development and implementation of ICT in teacher education.

- That the teacher education structure in Kenya comprises both pre-service and in-service teacher training programmes. The pre-service teacher education system bears the hallmarks of colonial influence, having been patterned on the basis of the European and Canadian models of teacher training. This provides some early evidence of international influences on

the teacher education system in Kenya, which is a possible analysis point in this study.

CHAPTER TWO

POLICY DEVELOPMENT AND IMPLEMENTATION: A REVIEW OF THE LITERATURE

Introduction

Whereas there now exists a vast body of literature around the general theme of policy development and implementation, there is very little that addresses the situation in Kenya. The literature review in this chapter is an analysis of the studies and ideas that are Africa based. Where available, I not only draw on examples from East Africa and the rest of the Sub Saharan Africa, but also look more widely at literature from elsewhere in the world to position the literature in a global context.

According to Presidential Circular No 1/2008, the Republic of Kenya is currently run by a Grand Coalition Government announced on April 13th 2008, with specific appointments and portfolio functions defined for various offices and Ministries that all work under the central government. The circular explains that each Ministry determines its activities and programmes under the broad functions as allocated, which may vary according to circumstances and as the needs arise. A lot of policy making activities therefore take place within the Ministries or other organs designated by the respective Ministries. This is similar to the pre-2008 period.

The Republic of Kenya has three organs of state namely: the executive, the legislature and the judiciary. These organs respectively correspond to the vital and most basic governance functions, namely: the conduct of policy and administration, the making or repealing or amendment of the governing laws and

the adjudication of conflicts that arise while laws are being implemented through executive and administrative decision-making or action (Ojwang, 2001). In Kenya, the president is both the head of state and head of government.

A number of areas in the literature are relevant to this study including approaches to policy development and implementation, and critiques of these processes. In the first section, I have looked at the generic issues around policy development and some approaches to policy implementation, exploring various understandings of policy and the policy development process, and drawing on examples relevant to the education sector. In the second section, I examine critiques of the policy development and implementation process.

2.1 Policy development and implementation process

Policy development

In the context of this study, where central government and the Ministries including those of Education, Science and Technology, and Information and Communications are key stakeholders, there is a need to evaluate literature regarding the sites of policy development. One definition of policy analysis as 'the study of what governments do and why' (Dye, 1992) shows the conceptualisation in some contexts of government as the sole source of policy. Given the tendency towards policy centralization evident in many countries in Africa, some studies have emphasized the need to reflect on the role of the 'state' and the central government in shaping policy (Smyth, 1993; Simon, 1991), while others, alternatively encourage an exploration of the institution as 'an important site of policy development' (Bell and Stevenson, 2006:p24).

Often, 'state' refers to the nation state, which is those institutions that function at the level of the whole nation, and in governmental terms are associated with national legislative bodies or parliaments. But any conceptualization of the state must also embrace regional and local institutions that are also publicly funded institutions and are therefore part of the state apparatus (Bell and Stevenson 2006; Dale 1989).

The terms 'state' and 'government' have often been used interchangeably in the research literature, but some authors argue that there are important differences between the two. Governments tend to be largely organised through political parties or coalitions of parties and represent public interests outside the state. The activities of the state are, therefore, far broader and more significant than those of government (Bell and Stevenson, 2006). In some instances governments may be considered 'to mediate the state and its subjects together' (Dale, 1989: p53).

The 'state' is in many instances presented as the source of educational policy, often posing challenges to those closer to the point of implementation:

> Educational institutions function in a context that is very largely framed by the state. Even where institutions are nominally independent of the state, they operate in a context where state regulation is substantial. Individual educational institutions have a relative autonomy from the influence of the state. Conflicts may arise as the values underpinning state policies and discourses may be challenged by those working at an institutional level (Bell and Stevenson, 2006: p38).

The traditional notion of the state that begins by identifying publicly funded national institutions, looking downwards to the regional and the local has been challenged as inadequate. Bottery (2000), for example, argues that global economic and political developments have brought forth supra-national institutions that perform many state functions in terms of policy development, but which function across nation states rather than within them. In some cases, these institutions, like the

African Union (AU), European Union (EU) and NEPAD, are increasingly beginning to resemble the traditional government institutions with developing constitutional and related arrangement (Bell and Stevenson, 2006). Regional integration advocated by these institutions has also been seen as a means of encouraging trade and securing economies of scale in Africa (Khandewal, 2004). In other instances, these supra-national institutions appear to be more disconnected from traditional state appearances but can have a similar or even greater impact on the development of policy at national or local level:

> Many of these institutions, like the WTO, have the capacity to exert significant influence on education policy in individual nation states. In developing countries, the influence of the World Bank on educational policy is significant (p28).

There are several theories and approaches to public policy making within individual countries. A common model in many settings including Africa, is the Rational Comprehensive Model that sees the policy making process as a smooth linear, hierarchical and essentially rational process consisting of two phases: policy formulation and policy implementation (Etta, 2005). In the formulation stage of this model, 'experts' (technical, subject matter, policy) statisticians and researchers identify the problem, analyse the options using the most sophisticated, up-to-date and applicable knowledge available (McGee, 2004).

The decision-maker is in this instance, therefore, confronted with a given problem that can be separated from other problems or at least considered meaningfully in comparison with them. The goals, values, or objectives that guide the decision-maker are then clarified and ranked according to their importance. Various alternatives for dealing with the problem are examined and the consequences (costs and benefits) that would follow from the selection of each alternative are investigated. Each alternative, and its attendant consequences, can then be

compared with the other alternatives. Finally, the decision-maker will choose that alternative, and its consequences, that maximizes the attainment of his goals, values, or objectives (Hill, 2005; Birkland, 2005).

But in other instances, the making and shaping of policy has been seen to be less a set of organised, predictable and rational choices than a complex, often unpredictable, and above all, political process (UNECA, 2004:p9; cited in: Etta, 2005). Here, the formulation process might sometimes begin with intense negotiation among interested parties to try and agree on an outcome which all of them would find acceptable. These negotiations may involve a number of participants outside government that would like to take part in the discussions on a particular policy. In Education, for instance, such participants might include a Parents Teachers Association (PTA), Non Governmental Organisations (NGOs) and other organised groups. Colebatch (1998) suggests that this complicates the concept of 'the top':

> The question is then, 'Where did the decision get made?' In the Minister's office, when she signed the recommendation to cabinet? In the meeting of interested parties, governmental and non-governmental, at which everyone agreed what would go into that recommendation? In the Cabinet room, where the recommendation was agreed to without discussion? (p29)

Other studies have also referred to the important role of 'unofficial actors' in the policy process. These include individual citizens, interest groups, political parties, 'think tanks', research organizations and communications media (Birkland, 2005). These actors are referred to as 'unofficial' because their participation in the policy process is often not a function of their duties under the constitution or the law:

> It is not the case that they have no legal rights or standing to participate in the process...rather it means that their mode of participation is not specified in law. Rather, their participation has evolved and grown as the nation has evolved and grown (p79)

Etta (2005) suggests that there is concern, especially in Africa, that policy formulation is dominated by state elites and is still confined to small and exclusive political circles like appointees to presidential commissions. This author draws a picture of a number of factors interplaying on the policy making process in Africa including donors and international development partners:

> The growing recognition is that in the politics of policy making, power is key. The crises of African development and the development of experiences of the colonial, independence, post independence, post colonial and globalizing state show the raw power which donors and international development partners, as they are now wont to be called, wield (p9).

ICT policies in developing countries

The existence of national ICT policies in developing country contexts that clearly outline specific outcomes has been seen by some to be a necessary prerequisite to minimizing ICT policy implementation failures in developing country contexts (Etta, 2005; UNESCAP, 2004). Some of these sources argue that the mere establishment of a written national ICT policy has value in itself (Kandiri, 2006) and suggests that at a minimum, the ICT policy conveys the message that the government is forward looking and intends to pursue the utilization of ICT in society, and adds that governments should aspire to more by putting the policy content into actual practice and becoming a role model in applying ICT in their own administration and services.

Often, ICT policies take into account other policy areas, such as education policies, information policies, trade and investment policies, and cultural and linguistic policies. Evidence in the research literature suggests that ICT policies ordinarily address the equitable development of ICT infrastructure, capacity building, development of legislation and policies to correspond to the requirements

of new ICT, institutional development and coordination, access to ICT and Monitoring of ICT (UNESCAP, 2004). The sub-elements under each of these aspects are presented in Table 1 below.

Wilde (2008) suggests that in the absence of a national ICT policy, the tendency is usually towards the creation of sector-dependent policy that addresses only its own ICT needs. These policies then become firmly entrenched within the sector and later, attempts to integrate them into a broad all-encompassing ICT policy become difficult. Sectoral policies such as education have to increasingly address issues relating to ICTs and the growing interdependence between the development of ICT policies and sectoral policies.

Table 1: Elements of a national ICT policy (*Source*: UNESCAP, 2004)

ICT policy element	ICT policy sub-elements
Development of ICT infrastructure	Infrastructure development
	Interoperation of information systems
	Enhancement of public services
	Cost savings in service delivery, purchasing, communication, etc.
	Electronic commerce and secure transactions
	Development of technological standards
Development of skills - Capacity Building	Research and development
	ICT education and training
Development of legislation and policies to correspond to the requirements of new ICT	Diffusion of information technology
	Development of ICT industries
	Trade policies for ICT-related goods and services
	Pricing and taxation of electronic services
	Protection of intellectual property
	Privacy of personal data
	Protection of cultural and linguistic diversity
	Protection against illegal and harmful content
	Adoption of standards
Institutional development and coordination	Institutional and regulatory structures
	National ICT development coordination
	International interface and cooperation
Access to ICT	Access to infrastructure
	Access to information
Monitoring ICT	Monitoring the use of ICT
	Measurement of the impact of ICT

In Africa, the NEPAD e-Africa Commission has the mandate to influence ICT policy within individual member countries (NEPAD, 2005). Another regional body in Africa that has significantly influenced ICT policy making in member countries is the South African Development Community (SADC). Its policy and regulatory framework on Information and Communication Technologies involve assisting member states in the formulation of national ICT policies based on SADC guidelines (SADC, 2010). SADC aims at:

> Promoting the active participation in international ICT fora to learn from other experiences, and consolidate a SADC position in this regard; establishing a SADC database on e-readiness and undertake e-participation assessments for effective strategy formulation and knowledge exchange; and also to building ICT literacy and awareness including commitment to the development of conducive policy environments and legal and regulatory frameworks for the knowledge-based economy (SADC, 2010).

Another supra-national initiative in ICT policy development in Africa is the Regional ICT Support Programme (RICTSP), funded by the 9th European Development Fund (EDF). It offers a development framework between the following regional bodies in Africa: Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Inter-Governmental Authority for Development (IGAD) and the Indian Ocean Commission (IOC). The overall objective of the RICTSP is to contribute to policies for regional integration agenda through an effective and efficient Information and Communications Technologies (ICT) environment. The goal is to reduce the costs of trade and investment, stimulate economic growth and reduce poverty, and finally, achieve a reduction in the digital divide by removing some of the constraints to the efficient use of ICT among member states (COMESA, 2007).

The role of donors in policy development

Some sources suggest that donor aid has had a big impact on national policies in Africa, and that at times, governments seem to change policy in order to access aid. In a criticism of the influence of international aid on policy formulation, Leys (1975) suggests that the intention of the donors had been to 'help harmonise comprador interests with foreign capital' (p251). His argument is that donor countries use international assistance to advance their own interests in developing countries. Otieno and Colclough (2009) concur that this was often achieved mainly by seconding technical experts to help with policy formulation and design of programmes in developing countries.

There is evidence in the research literature that the use of donor aid as a means of promoting particular policies in low-income countries, particularly those in Africa, became increasingly visible in the 80's. The economies of African countries declined, making them more susceptible to manipulation by the donor countries. This often happened as a result of the requirement that certain actions be taken by the receivers of aid as a condition for its provision (Windham, 1995; Odhiambo-Mbai, 1996; Otieno and Colclough, 2009).

Also discussed in the literature is the donor influence in the education sector in Kenya. The World Bank financing of Universities Investment Project (UIP) of the mid 1990s, for instance, included a condition that bound the government to admitting no more than 10,000 new students each year. The number of students qualifying for university education at the time remained much higher, yet the government, as a pre-condition for aid, contravened its own policy on widening access to higher education (Otieno and Colclough, 2009; Odhiambo-Mbai, 1996).

Other evidence in the literature also indicate that there are a number of success stories arising from policies in the education sector dictated by donor organisations. An example in Kenya is the ultimate elimination of untrained primary school teachers by the year 1994, as a result of intensive and sustained in-service teacher training programmes. Successful donor funded initiatives in teacher training and institution management in Kenya included the Primary School Management Project (PRISM), Strengthening of Primary Education programme (SPRED) and School-based Teacher Development programme (SbTD), respectively funded or run by the DFID and the British Council (Waudo, 2009; Otieno and Colclough, 2009; Cambridge Education Consultants, 1998).

In 1997, the United States Aid organisation (USAID) funded the Kenya Network Trust (KENET) through the Leland Initiative, a 5-year global information infrastructure project begun in 1996 whose main objective was to extend full Internet connectivity to African countries in order to promote sustainable development (KENET, 2007). According to this source, the aim of this support was to construct and operate a private telecommunication network that interconnected all universities and tertiary educational institutions. By the year 2007, KENET had realised national coverage for all institutions of higher learning.

Donor interest in use of new ICTs in teacher education are evident in Kenya in initiatives launched at the beginning of the 21st Century. In 2001, for instance, the School Based Teacher Development Programme (SbTD), an initiative funded by the UK Department for International Development (DFID), was launched to build the capacity of teachers in primary schools and improve their skills through the use of technologies (MoEST, 2004). By the year 2004, an ICT Scoping Study was commissioned to establish the professional, institutional, logistical, and cultural

and equity issues of teacher access to ICTs (MoEST, 2004). The MoEST received support from DFID, through its Imfundo programme to conduct this study, which would inform the implementation of the School Empowerment Programme (SEP) , a school-based multi-media training course for Head teachers, deputy head teachers, senior teachers and graduate Key Resource Teachers (KRTs) in primary schools in Kenya.

A subsequent policy making initiative funded by the USAID drew closely from this ICT Scoping Study, showing an interplay of interests between the donor initiatives in policy making. This study report informed the content of the *ICT in Education Options Paper* published in 2005. The study report forms the basis of an entire section of this policy document as acknowledged therein:

> The discussion [in this section] is taken in full from the ICT Scoping Study paper developed...for the MoEST and the Imfundo Project. The discussion is then taken a step further to advocate for the development and expansion of refurbishment centres in Kenya (MoEST 2005a:p43).

By the year 2006, other players had also shown interest in shaping ICT policy and practise in education through teacher education initiatives in Kenya. The Flemish Development Agency (VVOB), for instance, worked closely with the Ministry of Education to introduce new ways of integrating ICT in the technical teacher education curriculum offered by the Kenya Technical Teachers College (Janssens-Bevernage, Cornille and Mwaniki, 2005).

Around this time, the World Bank supported the development and implementation of the Kenya Education Sector Support Programme (KESSP), published on July 2005 to help achieve Education for All and the Millennium Development Goals (MDGs) in the subsequent years (Republic of Kenya, 2005b). Between the year 1997-2007, therefore, the major donors whose activities influenced education

policy initiatives included the DFID, USAID, VVOB and the World Bank. More details on how their activities fitted in the chronology of ICT policy development and implementation activities in the education sector and other related sectors are discussed elsewhere in this thesis (See: Chapter 5).

The involvement of the private sector in the policy development process in Kenya has also been documented. In 1998, Kenya, like many other countries, took a deeper interest in ICT policy issues as the new millennium approached. The National Millennium Bug Committee (also referred to as Y2K, which stands for Year 2000) had a composition which was drawn mainly from the private sector. This was one of the many 'public-private partnerships' (Eldon, 2005; p45) that emerged at the time. The Kenya Private Sector Alliance, the Nairobi Stock Exchange, the Kenya ICT Federation variously contributed, through Special Interest Group, Memoranda and directly in conferences, what their understanding was of what should go into the ICT policy that was evolving in the post-2000 era. Eldon (2005) sums this up in his evaluation of the private sector participation in policy development in Kenya:

> The private sector remains keen to sway ICT policy in directions that would enable Kenyans and Kenya...to reach full potential. Feedback from senior government sources indicates that a significant difference was made as a result of the efforts of the private sector. Private sector contributions to most of the ICT policy documents to date were significant indeed...However, success has many fathers, and all sorts of individuals and institutions will claim that they were key to each breakthrough (Eldon, 2005: pp54-55).

From the aforegoing, it is evident that influences on educational and ICT policy development are diverse and policy influences in developing country contexts tend to originate largely from the government and state, the supra-national institutions, the donor community and the private sector. Some influence also arises from 'unofficial actors'. The interaction of unofficial actors with individual actors is

however not as well defined in the literature as that among the other actors. These influences on policy development and their interrelationships are represented in Figure 4 below:

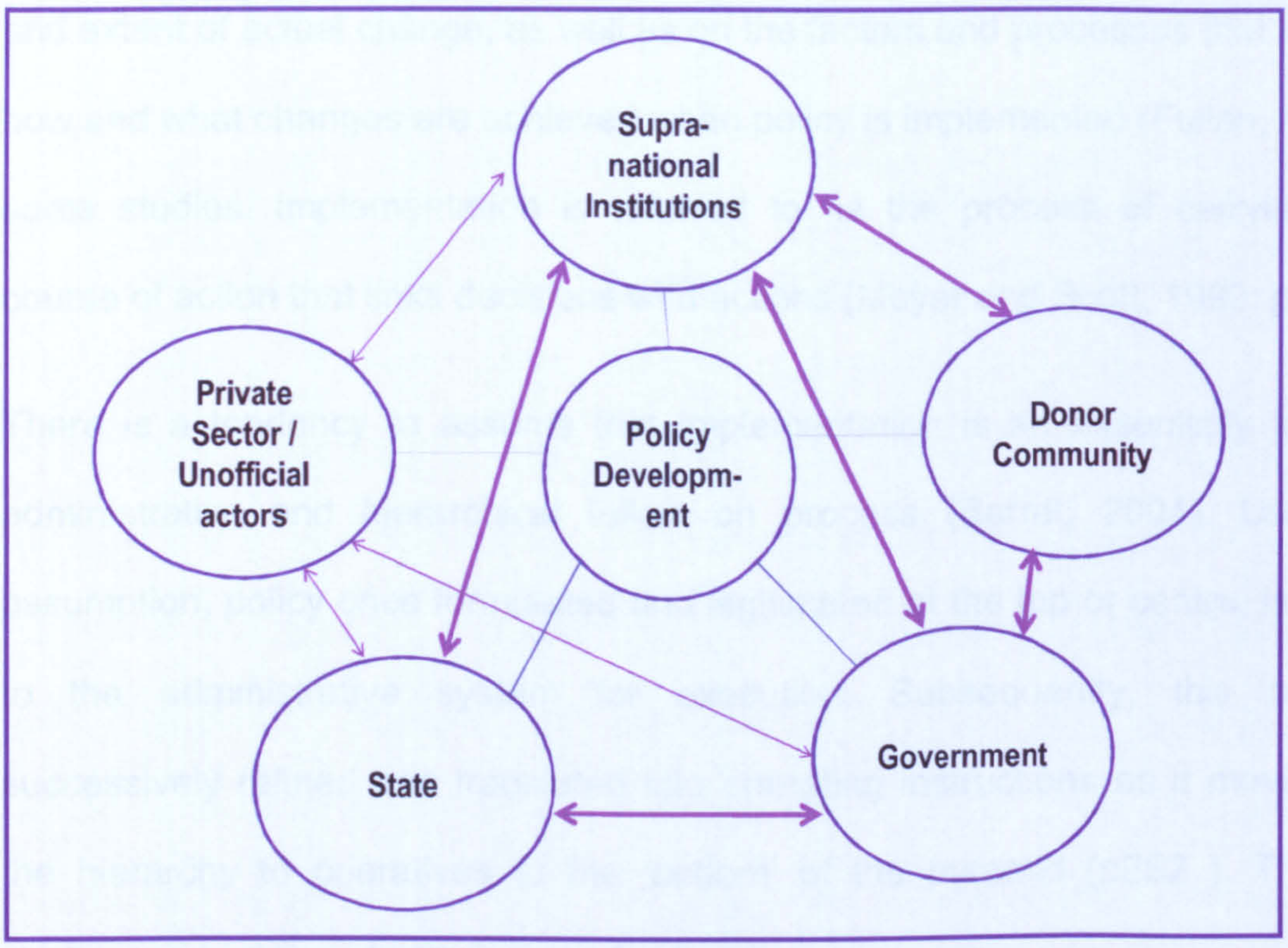

Figure 4: The various influences on general policy development

Policy implementation

Implementation of policy has also received attention in the research literature. The process of implementation is seen to be concerned with strategies used to translate policies into practice (Levin, 2001) and is relevant to the interaction of implementation strategies, the changes achieved, and also the factors that influence these changes (Wong and Li, 2008). Some studies also indicate that implementation is an ongoing developmental process, in which the outcome will

differ depending on the point in the process under study (McLaughlin, 1991; Sabatier, 1986).

A number of commentators focus on what happens in practice and on the nature and extent of actual change, as well as on the factors and processes that influence how and what changes are achieved when policy is implemented (Fullan, 1992). In some studies, implementation is referred to as the process of carrying out a course of action that links decisions with actions (Meyer and Scott, 1992: p134).

There is a tendency to assume that implementation is an essentially top-down administrative and hierarchical follow on process (Barret, 2004). Under this assumption, policy once formulated and legitimated at the top or centre, is handed to the administrative system for execution. Subsequently, this policy is successively refined and translated into operating instructions as it moves down the hierarchy to operatives at the 'bottom' of the pyramid (p252). There are challenges to this as I will discuss shortly.

A number of policy implementation models are discussed, and debate around the 'top-down' (or forward mapping) and 'bottom-up' (or backward mapping) models predominate the literature. In the top-down model of implementation, the implementation process is defined by those actions by individuals or groups that are directed at the achievement of objectives set out in prior policy decisions which are manifested in goals and means to achieving them. In this model, it is assumed that implementation cannot succeed or fail without a goal against which to judge it (Van Horn and Van Meter, 1976; Pressman and Waldavsky, 1973). The top-down implementation model 'draws from the stages model and involves making a clear distinction between policy formulation and policy implementation' (Hill, 2005: p176).

The top-down model reflects the traditional structures of governance and public sector organization, emphasizing the separation of politics and administration, co-ordination and control through authority and hierarchy. In the early 1980s, the role of implementation studies was:

> ...to identify the causes of implementation problems or failure, and suggest ways of enhancing the likelihood of obtaining compliance with policy objectives, generally focused in strategies for improved communication of intentions, co-ordination of the 'links in the chain', management of resources and control of implementing agents (Barret, 2004: p21)

The 'bottom-up' approach, also referred to as 'backward mapping' by Elmore (1979), is an alternative to the top-down model. According to Elmore, backward mapping shares with forward mapping the notion that policymakers have a strong interest in affecting the implementation process and the projected outcomes of policy decisions. However, he indicates that backward mapping explicitly questions the assumption that policymakers ought to, or even do, exercise the determinant influence over what happens in the implementation process. It also questions the assumption that explicit policy directives, clear statements of administrative responsibilities, and well-defined outcomes will necessarily increase the possibility that policies will be implemented with the level of success anticipated in the policies. Backward mapping begins not at the top of the implementation process but at the last possible stage:

> ...the point at which administrative actions intersect private choices. It begins not with a statement of intent, but with a statement of the specific behavior at the lowest level of the implementation process that generates the need for a policy. Only after that behavior is described does the analysis presume to state an objective; the objective is first stated as a set of organizational operations and then as a set of effects, or outcomes, that will result from these operations. Having established a relatively precise target at the lowest level of the system, the analysis backs up through the structure of implementing agencies (Elmore, 1979: p604).

Whereas backward mapping may not be a better alternative to the top-down approaches, it is a different one that may be more effective in some circumstances

(Fiorino, 1997). This author, however, observes that forward mapping offers a more promising strategy for the reform process when a consensus exists on the need for and the form of change at high policy levels, such as the executive, and 'when mechanisms for implementing change lie within policy makers' control' (p261). I discuss this and other critiques of the policy development and implementation process in the next sub-section.

2.2 Critiques of the policy development and implementation processes

As pointed out in sub-section 2.1, there has been an increase in the literature that faults the centralized approaches to policy making and implementation. Such literature takes issue with the 'policy as text' and also 'policy as top-down' discourse. In this section, I particularly focus on critiques related to these two areas. Where appropriate, I have also drawn examples and discussed these critiques in the context of the education sector.

Since policies are typically promulgated through official written documents, a large body of literature focuses on the effectiveness or otherwise of 'policy texts'. Texts, like the Acts of Parliament and sessional papers in Kenya, may outline a law or a regulation, or a set of all laws and regulations that govern a particular issue, area or problem, but their role in directing actual policy implementation has been questioned by a number of researchers (Birkland, 2005; Samoff, 1999). Some have suggested that policy texts tend to be 'busy, abstract and tidy' yet the processes of change and policy implementation are much more complex and fraught with contradictions and paradoxes (Ball, 1997: p270; Elmore, 1979).

Policy texts fit well with the top-down model of implementation, where the implementation process is defined by those actions by individuals or groups that are directed at the achievement of objectives set out in prior policy decisions (Van Horn and Van Meter, 1976). Also, policy as 'text' is the element of policy 'that can be worked on, interpreted and conceptualised, and stands in contradiction to assumptions that policy works in a straight line from formulation to implementation' (Ozga, 2000: p94).

A large body of literature tends to focus on the politics of policy making assuming implementation as an essentially top-down administrative and hierarchical follow-on process as discussed in the previous section. However, some authors have argued that the policy implementation process is more complex than the top down model implies, and that there is a dialectical process in which the 'moments' of legislation (The Act), documentation and 'implementation' (the work of teachers and other actors) may be more or less loosely coupled (Bowe and Ball, 1992: p98; cited in Ozga, 2000).

The limitations of the 'moments of legislation' are further captured in the research literature that points out that legislated texts are unlikely to determine how policy is actually implemented owing to certain inherent weaknesses. It is argued in the research literature that texts are generalized and written in relation to idealizations of the 'real' world, and can never be exhaustive as they cannot cover all eventualities (Bowe, Ball and Gold, 1992). These authors observe that the texts can often be contradictory as they use key terms differently, and they are reactive as well as expository:

> Policy is not done and finished at the legislative moment, it evolves in and through the texts that represent it, texts have to be read in relation to the time and particular site of their production. They also have to be read with

> and against one another – inter-textuality is important. Second, the texts themselves are the outcome of struggle and compromise. The control of the representation of policy is problematic (p21).

In line with this argument, it has been observed in some sources that policy documents may remain partial, often ephemeral, and inherently vulnerable and they may be distorted, deflected, or simply ignored. With all the 'spaces, silences, and contradictions' therefore, these policy texts remain a resource for practitioners [like teachers] to develop 'policy-in-use' (Samoff et al. 1994: p22-23).

Policies pose problems to their subjects, problems that must be solved in context, and solutions to the problems posed by policy texts will be localised and should be expected to display 'ad-hoc-ery' and messiness' (Ball, 1997; p270). Having a formal policy, therefore, may only be the beginning of the policy process, and that what is critical is what happens as a consequence. Other studies have suggested that policy has to be understood not in terms of intent but in terms of commitments (Colebatch, 1998):

> Goal statements may be significant, but they are unlikely to tell the whole story, and their absence does not mean that there is no policy (p9).

Constitutional, statutory and case law yield formal statements of educational purposes as well as norms by which education should be conducted. The complexity of the teaching system and subtlety of the teaching task, for instance, mean that what actually happens cannot be 'read off' simply from the policy objectives that are set out by the key actors in the system (Wise, 1980; Hill, 2005).

Other critiques have focused on the tendency to look at policy as a means to an end, if the end represents an expected outcome. This tendency to weigh the relationship between means and ends to ensure that practice conforms to the norms has been referred to as 'bureaucratic rationalization' (Weber, 1946: cited in

Wise, 1986). Rationalization occurs when the relationship between means and ends is known, when ends are attainable given the means and when means are reasonable given the ends (Wise, 1980). When the relationship between means and ends is not known, bureaucratic rationalization persists, leading to the phenomenon of 'hyperationalisation', which is:

> ...an effort to rationalize beyond the bounds of knowledge. This involves imposing means which do not result in the attainment of ends or the setting of ends which cannot be attained given the available means, imposing unproven techniques on the one hand, and setting unrealistic expectations on the other (Wise, 1980; p65).

Wise further indicates that what often appears to be logical may or may not have a connection to reality. Where the connection to reality is absent, a policy intervention will lead to hyperationalisation, e.g. prescription of expected outcomes, individualized instruction, objectives-based education and class size. When policy prescriptions are made without consideration to resource constraints, for instance, 'a number of logical inconsistencies are the likely result of efforts to prescribe input, process and outcome controls' (p66). In line with this, other critiques take the focus away from prescribed policy to motivations among the actual agents of implementation and argue that policy goals are often ambiguous rather than explicit and may conflict not only with other goals in the same policy area, but also with the norms and motivations of what Elmore (1979) calls 'the street-level bureaucrats' (p609).

Whereas the top down models are more concerned with compliance, backward mapping values understanding among these street-level bureaucrats, of how conflict could be alleviated 'by bargaining and sometimes compromise' (Birkland 2005: 185). Backward mapping assumes that groups are active participants in the implementation process. However, backward mapping has been faulted for not

taking into account the power differences of different groups (Sabatier, 1986; May, 1990; Schneider and Ingram, 1992).

Implementation of education policies

Evidence in the literature suggests that education is one sector where the actual characteristics of policy are very likely to be considerably influenced at the point of delivery by teachers and other players at the school. The role of the government in the delivery of services in the education sector is manifested in many different ways at the point of implementation:

> ...In many respects, education policy is determined by what teachers actually do (Hill, 2005: p125).

In the Kenyan context, the government provides educational services through government funded institutions, variously known as public schools, public colleges or public universities. The Ministry of Education directly oversees the implementation of policy in these institutions and also regulates the private schools and colleges, which are often but not always required to offer the national curriculum. The teachers and teacher educators in these institutions are often expected to deliver the outcomes stipulated by the Ministry of Education. Teachers are indeed active players at the point of implementation.

In some studies, it has been established that teachers particularly react defensively to policy change and tend to regress to old practices, often secretly (Corey, 1995). Huberman (1973) supports this view in observing that if policy is viewed as an imposition, people react regressively. Whereas resistance is mostly a covert process, it manifests overtly in the final outcome and probable non-implementation (Smit, 2005). Teachers may suggest that policy changes have indeed been implemented or are taking place but, in reality, the gap between

rhetoric and practice is wide. Mostly, it is a matter of 'business as usual' in the classroom despite legally imposed policy (Wong and Li, 2008).

Teachers and schools appear to be disconnected policy receivers in many contexts (Bowe and Ball, 1992; p7) and although national education policy influences teachers' work, there are hidden contextual micro-decision-making processes and dynamics, which have been ignored. Some studies suggest that unless teachers are recognized as part of the education system, real impact of policy implementation 'remains a puzzle' (Crossley and Vulliamy, 1995: pp6-10). The silent voices of the teachers, who are either overwhelmed 'beyond their control' or 'autonomous resisters or subverters of the status quo' (Bowe and Ball, 1992) is therefore a subject of research interest.

Education policy can be filtered and those parts that 'fit' with teachers' personal perspectives and intuition can be selected (Smit, 2005). Some studies also suggest that imposition of education policy often elicits some form of criticism, which inevitably colours teachers' perceptions and ensuing responses (Sikes,1992). Furthermore, imposed and forced education policy implies an official authority, which may challenge the professional experience and expertise of teachers (Colebatch, 1998).

This 'imposed' or 'forced' policy has also been described as 'wishful thinking' in some sources:

> ...'Wishful thinking' occurs when 'policy makers' behave as though their desires will be accomplished by simple decree. There is the tendency of policy makers to require by law that schools achieve a goal which in the past they have not achieved, thereby engaging in a form of hyperrationalisation (Wise, 1980: p68).

A number of factors that have been deemed to contribute to what has been perceived as 'implementation failure' (Barret, 2004) include; lack of clear policy objectives, leaving room for differential interpretation and discretion in action; multiplicity of actors and agencies involved in implementation, creating problems of communication and co-ordination between the links in the chain; inter and intra-organizational value and interest differences between actors and agencies, creating problems of differing perspectives and priorities affecting policy interpretations and motivation for implementation; and finally, relative autonomies among implementing agencies with limits of administrative control.

2.3 Conclusion

In this chapter, I have reviewed perspectives in the literature that focus on the policy development and implementation processes. I have also highlighted some critiques of policy development and implementation in the literature. A number of key ideas arise from this literature review, which I return to later (Chapter 8). These key ideas are:

- Policy, in respect of ICTs in teacher education, needs to be understood as part of the wider social and political context, including various structures of authority both within a country and in external international contexts. In Africa, the international supra-institutions (like the African Union, NEPAD, COMESA and SADC), donor organisations, government and the state, private sector and non-official actors seem to be parallel and often interrelated sources of policy.

- Acceptance of donor support by developing countries from donors such as the World Bank, USAID and DfID, has often meant that internal policies are superseded by the donor conditions, thereby compromising the provisions of national policies in many instances.
- Post independence political and bureaucratic structures in Sub Saharan Africa are predominantly centralized, with an emphasis on hierarchical decision making processes. The Ministries and other related government-level institutions are therefore the main sources of national policy in education, leading to a top-down conceptualization of the policy process.
- National policies are often typically promulgated through formal statements which are then passed down to the next hierarchical level for implementation. However, educational policy texts tend to be recontextualised through various interpretations by teachers and other actors in the implementation chain. In the Kenyan context, the implementing agencies would include leadership of organizations that oversee various projects in the education sector, and also teacher education institutions and programmes.
- In reviewing the literature, it appears that the idea of hyperationalisation might have some explanatory power in looking at centralized policy making and implementation processes in Africa and Kenya in particular. Closely related to this is the concept of 'wishful thinking' where policy outcomes display inadequacy of understanding by the policy making persons of the real needs of the implementing agents and contexts, hence the failure of certain policy prescriptions to yield the desired outcomes as outlined in the work of Wise (1980).

- The tendency of hierarchical organizations to implement policy down through a hierarchical system has been termed by Elmore (1979) as 'forward mapping'. This process may be prevalent in the Kenyan context and Elmore's alternative approach, 'backward mapping', may offer an important alternative, as it considers policy as only one of the many possible influences on the actions and behaviour of people involved in the policy implementation process.

CHAPTER THREE

ICT POLICIES AND PRACTICES IN EDUCATION: PERSPECTIVES FROM THE LITERATURE

Introduction

Based on the working definition of ICT given in the introductory section of this thesis, ICT policy can be expected to cover 4 main areas: hardware and software, telecommunications (especially telephone communications), broadcasting (radio and TV) and the Internet. A national ICT policy would be expected to set out the country's aims, principles and strategies for the delivery of Information and Communications Technology (Kandiri, 2006). Therefore, if technology and the education sector are coming together around the internet and other evolving ICTs (See: Introduction), players in the policy process would be expected to recognise this and adapt their policy-making and implementation processes accordingly.

This study considers ICT policy implementation as what happens in practice, the nature and extent of actual change, as well as the factors and processes that influence how and what changes are achieved with ICT, in line with Fullan (1992). My points of analysis are respectively anchored on Fullan's three pillars of educational improvement namely: technology, change and pedagogy (Fullan, 2004). I have therefore structured this chapter to explore the potential of ICT to bring about change in teaching and learning, the role of ICT in teacher preparation and also research findings on some of the challenges to ICT policy implementation in education.

3.1 ICT for teaching and learning in schools

A number of studies suggest that ICT use in education generally brings with it new approaches that are effectively redefining the old approaches to teaching and learning. Others point out that new electronic and wireless technologies and delivery systems are changing how information is conceived, packaged, and transmitted. Mobile, personal, and wireless devices might be expected to radically transform societal notions of discourse and knowledge, and are responsible for new forms of art, employment, language, commerce, deprivation, and crime, as well as learning (Traxler, 2007; Alexander, 2004; Arafeh, 2004; Katz and Aakhus, 2002; Brown and Green, 2001). The application of mobile technologies in learning, particularly, can be seen to represent a new frontier in education and pedagogy that supports new delivery platforms for teaching and learning and also enables 'ubiquitous learning by connecting instructors and learners in both traditional classroom and online settings' (Traxler, 2007: p9).

Besides changing the structure of how students experience learning, information literacy enhanced by ICT has the capacity 'to expand knowledge' (Shih and Mills, 2007:p3). Teachers find ICT useful in their teaching as it makes the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable (Cox et al,1999). Teachers' decision to use ICT in the classroom is suggested to be influenced by a range of factors, including: access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in the school, school and national policies, commitment to professional learning and background in formal computer training model (Loveless, 2003; Harris, 2002; Kozma and Anderson, 2002; Smeets and Mooji 2001; Wheeler, 2001).

Other studies addressing ICT implementation in teaching and learning claim that schools must be transformed from bureaucratic to learning organizations in order to adapt to the digital age (Aviram, 2000; Pelgrum and Anderson, 1999). Argyris and Schon (1996) suggest two ways in which this can happen. The first is through single-loop learning that changes strategies of action in ways that leave values unchanged; and the second is double-loop learning that results in a change in values as well as in the strategies of activity. Other studies have also suggested that in order to realize the potential of ICT to transform education, there must be effective institutionalization of ICT policy into the routines of schooling (Tubin, 2006; Somekh, 2007). The implementation process is seen to be important in deploying ICT in schools and, although different types of technology do make a difference in a given educational setting, what counts 'is not the ICT type but its implementation process' (Tubin, 2006: p86).

Tubin describes two types of ICT implementation processes: Type I implementation which adopts the innovation decisions but leaves routines almost unchanged, and Type II implementation which turns the innovative decisions into practices. The types differ in three basic domains: teachers' roles, teaching methods, and time and space configuration. Teachers in Type I implementation tend to use ICT technology to attain the same traditional goals, under the same conditions, while leaving values unchanged. In other studies, teachers in similar circumstances have been found to work in relative isolation from one another and from sources of ideas beyond their own background of experience (Goodlad, 1984). Under conditions of routine, overloads, and limits on reform, collaboration among teachers is found to be weak or nonexistent (Goodlad, 1984; Sizer, 1992). Integrating ICT into this situation leads to teachers taking individual action and very simple ICT practices (Cuban, 2001).

Type II implementation, on the other hand, gives teachers greater autonomy so they can challenge both the pedagogical goals and the means for using ICT. To accomplish such a mission, teachers collaborate on curriculum development, expand classroom boundaries, connect students to real-world events, and serve as advisors or guides in encouraging independent learners (Kozma, 2003). Using computers and accessing the web in schools and taking advantage of quality learning products in CD-ROM, linking institutions through video and computer conferencing all create favourable conditions for increasing students' autonomy and stimulating self-learning (Katz and Aakhus, 2002).

Linked to this, is the proposal by Maddux, Johnson, and Willis (2001) of categories of ICT applications in use in schools: Type I applications are those that simply make it easier, faster, or more convenient for teachers to continue teaching in traditional ways. Type II applications, on the other hand, make available new and better ways of teaching and learning. These are ways that would not be possible without technology. Other studies in agreement with this suggest that Type I applications are common in schools before the Internet becomes reasonably priced, user-friendly and readily available, while Type II becomes common as the schools' infrastructure continues to improve (Pelgrum and Anderson, 1999).

According to Cuban (1993), teachers tend to appropriate new technologies and incorporate them into their traditionally held views of teaching and learning as in Type I above. Cuban argues that the computer, just like the overhead projector and video will make very little impact on teaching styles. An opposing argument, however, suggests that computers are substantially different from previous technologies because multimedia and hypertext give students access to new ways

of thinking through dynamic images, simulations and models (Selinger and Davis, 2003).

Trends in ICT use in schools tend towards applying ICT more as a mindtool, which refers to ICT being a cognitive aid that supports higher order and critical thinking skills. Learning institutions move towards more collaboration, interactivity and active learning; towards more integration of ICT in curricula and a better technical and pedagogical infrastructure. The use of ICT in this manner supports ideas of constructivist learning, where learning is an active process of constructing rather than acquiring knowledge, and instruction involves supporting that construction rather than simply communicating knowledge (Kirschner and Davis, 2003; Boshuizen and Wopereis, 2003; Duffy and Cunningham, 1996).

Fullan (2004) argues that there are three pillars of educational transformation: technology, pedagogy and change. He suggests that technology can play a role in enhancing educational improvement as it links to innovations in teaching and learning or pedagogy, and to change knowledge. The author refers to this as the 'change knowledge pillar' (p2). Change knowledge refers to the understanding and insight about the process of change and the key drivers that make for successful change in practice. Fullan outlines some 8 key drivers of change as: engaging people's moral purposes, capacity building, understanding the change process, developing cultures for learning, developing cultures of evaluation, focusing on leadership for change, fostering coherence making, and cultivating tri-level development. Fullan argues that failing to use these 8 guiding drivers of change in the process of transforming education using any form of innovation leads to a slowed down or even a failed implementation.

From this review of the literature it is evident that the various ways in which ICT might support education have been documented. Some researchers have, however, argued that the desired change with ICT in schools depends on the effectiveness of ICT policies related to teacher preparation programmes (Kinuthia, 2009; Kirschner and Selinger, 2003; Wong and Li, 2008). Recent implementation studies have indicated that ICT capacity building for teachers is one of the key organisational issues in the process of school change (Fullan and Watson, 2000; McDonnell and Elmore, 1991; McLaughlin, 1991; Smylie, Miretzky, and Konkol, 2004; Van der Vegt, Smyth, and Vandenberghe, 2001).

3.2 ICT policy and teacher preparation

Many arguments in the research literature place the teacher at the heart of the success or failure of educational change, suggesting that unless a teaching and learning initiative transforms teachers' practice such that they can transform their students' learning, the initiative cannot be interpreted as having been successful (Harvey and Kamvounias, 2008; Fullan, 1989). Others observe that teachers are increasingly on the front line in implementing policies designed to reap educational benefits from investments in ICT and therefore changes in the effectiveness of teacher training and professional development have become key issues and will remain so (Kinuthia, 2009; Kirschner and Selinger, 2003). Research has suggested that one of the major challenges facing teacher education in many countries is the lack of a stable policy basis for development: policy on teacher education is fragmented, incomplete and often simply underdeveloped (Moon, 2006; p18).

Other sources have suggested that teacher education is often neglected in Africa in the face of more immediately visible educational goals and objectives (Unwin, 2005; Clegg, Ogange and Rodseth, 2003). Teachers are very important in the process of implementing ICT policy in various institutions in the education sector and regardless of the amount of technology and its sophistication, technology will not be used effectively unless teachers and teacher educators have the skills, knowledge and attitudes necessary to infuse it into the curriculum (Wong and Li, 2008; Albirini, 2006; Baylor and Ritchie 2002).

Inadequate teacher expertise has been said to be a bottleneck in the application of ICT in schools both in Africa and elsewhere in the developed world. (Kinuthia,

2009) reports that few teachers in the school system in Kenya are computer literate, and even fewer can competently use a computer as a teaching resource or a tool for instruction. Preparing teachers is perceived as the main critical success factor in deploying ICT in schools (Yapp, 2001). All efforts towards integrating ICT in the curriculum must be comprehensive enough to provide the requisite infrastructure and prepare teachers adequately to use it effectively.

Various proposals for the form of ICT in teacher education in Africa are observed. Teacher training institutions in Africa have often only offered student teachers training on basic computer packages (Unwin, 2005). Thus there is a need for clear policy guidelines for a teacher preparation system that recognizes that the teacher's expertise need not stop at the level of basic ICT skills, but the successful deployment of ICT both to improve learning and engage in continuing professional development (Kenya Instititute of Education, 2005) . Pre-service teachers need also to be aware of other appropriate software like tutorials and simulations, and use these programs to enrich their courses in an ICT-integration process (Goktas, Yildirim and Yildirim, 2009; Weets, 1997; Yapp, 2001).

Schools of teacher education and other related teacher education programmes therefore have a crucial role to play in preparing teachers to become proficient in the implementation of ICTs in education and integration of ICTs into the curriculum (Goktas, Yildirim and Yildirim, 2009). Teachers who use computers in their classrooms tend to be those who can clearly relate the use of technology to their pedagogic strategy for their own subject (Watson and Tinsley, 1995). Such teachers recognize the way that ICT is indeed changing the nature of the subject that they teach.

The success of any innovation involving ICT use in schools therefore resides in the professional competencies of the teacher modelled around 'a complex identity...a personal view of what constitutes good teaching... and a belief in the purposes of 'subject' (Leach and Moon, 2000: p397). ICT alone does not make old teaching habits effective and therefore training teachers in the use of ICT in their own curriculum areas should be the start of a process of educational transformation, not its completion (Yapp, 2001; Cox et al,1999).

Some studies have argued that top priorities for both pre-service and in-service programmes for teacher training should aim at teachers becoming sufficiently competent to make personal use of ICT:

> [Teachers should be] competent to make use of ICT as a mindtool, become masters of a range of educational paradigms that make use of ICT, and sufficiently competent to make use of ICT as a tool for teaching. All of this needs to take place in an environment that adopts and models modern constructivist thinking and pedagogy (Kirschner and Selinger, 2003: p6-7).

Others indicate that teachers should learn how and when to use the new tools that have been provided through ICT in order to prepare students for study, life and work in the twenty-first century. Their awareness of the dangers and pitfalls of ICTs must be raised in order to further prepare their students (Boshuizen and Wopereis, 2003). This implies that teacher preparation needs to be geared towards developing the teachers' pedagogic practice and not mere knowledge of the technology.

When teachers learn with ICT, the presentation and distribution of instruction is primarily through web environments or systems offering an integrated range of tools to support learning and communication (Collis and Moonen, 2001). The emergence of a generation that has grown up in a society immersed in technology has placed new demands on teacher preparation. Prensky (2001) calls this

generation the 'digital natives - the generation that has spoken the language of technology from birth'. Such familiarity and comfort with all things digital presents challenges for educators who struggle to keep up with 'an ever-changing technology context and students who no longer process information primarily in a sequential manner' (Goktas, Yildirim and Yildirim 2009, p264). This may be applicable to the more urban settings in Kenya, where computers are increasingly becoming available to the urban youth. The same cannot be said of the rural and peri-urban areas of Kenya.

With new demands for meaningful and contextual application of technology in classrooms, teacher preparation becomes both increasingly important and challenging as teacher educators seek new ways to integrate 21st century skills, non-linear thinking skills, and digital-age reflections into coursework (Partnership for 21st Century Skills, 2002). Today's student and their teachers must not only learn how to think deeply about their learning so they can realize their place in a rapidly changing, global society, but they must also learn to apply technology tools appropriately in order to process multiple perspectives on real-world problems and formulate solutions to these problems (Goktas, Yildirim and Yildirim 2009).

Because of the changes in learner characteristics discussed above, teachers and teacher educators are particularly challenged to invent ways to include reflection and critical thinking into their learners' learning (Lambert and Cuper, 2008; Clegg, Ogange and Rodseth, 2003; Ogange, 2002). Teachers and teacher educators need to understand the changes in the mindsets of today's student teachers and other learners, and find new methods and ways to speak their new language in and outside of traditional classroom settings (Prensky, 2001).

Teacher educators should act as role models for prospective teachers by using ICTs to demonstrate their competency and willingness to use ICTs in teaching and in their classrooms (Goktas, Yildirim and Yildirim, 2009). It has been suggested that teacher educators need to help prospective teachers understand how ICTs can be used to teach subject content in rich and meaningful ways (Kinuthia, 2009; Keating and Evans, 2001). A number of these studies are drawn from developing country contexts, and similar issues are present in Kenya.

All of the pedagogical opportunities afforded by ICT need to be part of current teacher education programs (Cochran-Smith, 2008). Preparation of tomorrow's teachers, it has been argued, does not depend solely on how well emerging technologies are incorporated into college coursework. On the converse:

> ...It rests on how well in-coming teacher educators are taught to *leverage* the technologies to help their students develop these same skills. Twenty-first-century skills fall into six distinct categories, each of which can be readily engaged through careful use of multimedia technologies in the classroom setting: critical thinking, information and media literacy, creativity, communication skills, collaboration, and contextual learning (Partnership for 21st Century Skills, 2002; in Cochran-Smith 2008: p265).

Grimmet and Chinnery (2009) suggest the need to educate teachers as 'curriculum makers'. This is said to be key to realizing the connection between policy and pedagogy and the protection of 'the practical space' for the development and exercise of professional expertise and judgment that is necessary for learning to occur. These authors use 'bridging' to refer to both the connection between policy and pedagogy and to the act of connecting the two, while 'buffering' is used to indicate a shielding or cushioning of learning situations against 'potential adverse effects' by educating teachers, as curriculum makers, to practice professional pedagogy (p125).

The significance of ICT use in promoting various competencies in teachers and teacher educators is discussed by UNESCO (2002b); competencies include content and pedagogy, technical issues, social issues, and collaboration and networking. Besides, pedagogical use of ICT 'requires that teacher educators are able to assess and evaluate learning and teaching in open and flexible learning environments' (p42). Teacher educators, it is frequently suggested, need more training to understand how new technologies can be integrated into teacher preparation (Cochran-Smith, 2008; Roblyer and Edwards, 2000).

Activity in policy making for ICT use in teacher education has been discontinuous, and curriculum development, teacher education and pedagogy have been perceived and treated as discrete and separate areas, which presents a challenge to the teacher preparation environment (Kirschner and Selinger, 2003; Kinuthia, 2009). This incoherence in ICT policy for teacher education has also been noted by Kirschner and Selinger (2003). They suggest that policy in teacher education needs to underpin utilization of ICT into all aspects of the pedagogy of a school:

> ...integration of ICT in education will only come when the links between ICT, the curriculum, teachers' needs and professional development in schools are forged within such a framework' (p9).

It can be concluded that teachers and teacher educators are key to ICT policy implementation in education. They are key actors in the transformation of education both in Africa and elsewhere in the world. Inadequate teacher expertise, inappropriate curriculum content for teacher education and infrastructural limitations seem to potentially inhibit the capacity of teachers and teacher educators to effectively implement ICT policies in education. The lack of clear policies for the deployment of ICTs in teacher education, however, seems to challenge the implementation of ICT in teacher preparation.

3.3 Challenges to ICT policy implementation in education

The literature reviewed in the previous sections point out the potential of ICT to transform teaching and learning, and the importance of forming and implementing ICT policies in teacher education to realise the desired educational transformation. A number of studies reviewed in this section, however, indicate that ICT policy implementation in schools and other institutions of learning has proved problematic in developed countries and developing countries alike, with minimal progress made in terms of the attainment of the expected changes. There are many challenges to implementation of ICT policy in teacher education in Sub-Saharan Africa, including non-availability of resources and capacity to train and retain big numbers of teachers (Cawthera, 2001). In developing countries such as Kenya, teacher training colleges lack state-of-the art educational technology, which is a stepping stone for positive changes in future teachers' behaviour (Weunda, 2005; Osin, 1998).

While ICT has been a feature of schools in Western countries for a number of years, research findings indicate that in many cases, teachers' practices mediated by ICT have undergone minimal or no change (Conlon and Simpson, 2003; Tearle, 2003; Cuban, 2001; Norris, Sullivan, Poirot, and Soloway, 2003). Even though significant investment has gone into equipping schools and teacher training institutions with ICT infrastructure, research shows that ICT is yet to impact on teaching and learning (Stensaker, 2007; Cox et al, 1999; Passey and Samways, 1997). Several similar trends have been witnessed in developing countries (SAIDE, 2005).

Numerous studies have been undertaken to investigate this phenomenon, and a common and dominating perspective underpinning these studies is the expectation of change of a particular kind (Orlando, 2009; Fullan, 2004). Orlando observes that higher education institutions, which also train teachers in a number of contexts, are particularly well-known for their ability to protect 'traditional core activities' from external interference. There is therefore lack of direct effects of ICT on traditional teaching and learning activities and 'Chalk and Talk' is, in many institutions of higher learning, still the dominant and most legitimate 'teaching technology' in use.

A number of researchers have attempted to explain why the pace of change with ICT in educational settings has been slow. Some have argued that working with ICT is difficult because ICTs are new, and individual and social routines have to be established in using them (Goktas, 2009). Others have suggested that new technology would not necessarily change pedagogy as such, but needs to be accompanied by measures that stimulate and encourage such change (Oliver and Dempster 2003).

This situation seems to be blamed on the tendency of the policy planners to ignore potential ICT policy implementers as they attempt to effect such change:

> The policy planners have often introduced changes without providing a means to identifying and confronting the situational constraints and without attempting to understand the values, ideas and experiences of those who are essential for implementing any changes (Fullan 2001: p98).

Closely related to this is the lack of ownership of the change process. Shared ownership of something new on the part of large numbers of people is tantamount to real change, but 'ownership is not acquired that easily' (Fullan 2001: p92). Fullan argues that when people are apparently in favour of a particular change,

they may not 'own it' in the sense of understanding it and being skilled at it; that they may not know what they are doing. He argues that 'ownership in the sense of clarity, skill and commitment is a progressive process' and opines that true ownership is not something that occurs magically at the beginning, but rather is something that comes out of the end of a successful change process.

One of the challenges that ICT presents to education, especially formal education, is the rapid change that it introduces to the entire context of education. The combination of wireless technology and mobile computing is seen to result in an escalating transformation of the educational world. This convergence of technologies means that a shift will be necessary in teachers' profiles and roles. Rather than being the sole owners of knowledge transmitted in the classroom, it is argued that teachers will become mediators between students and their access to information provided by various sources (Alexander, 2004; Trindade et al 2000).

Change in teaching and learning using ICT has been seen to be impeded by the endurance of traditional aims of teaching (Cuban, 1993). Cuban suggests that change brought about by ICT might only be realised in a holistic approach that takes cognizance of the very philosophies of learning and teaching:

> ...as long as schools continue to do for society what they have historically done, which is: 'pass on prevailing values and accumulated knowledge to the next generation, improve ways of teaching and learning the prescribed curriculum, sort out those children who achieve academically from those who do not, and give taxpayers as efficient a schooling as can be bought with available funds,' any caution toward major changes, hammered out of these traditional aims for schooling, leads to adding-on to what exists now (p19).

Cuban further argues that in this context, computers and other forms of technology are seen as important but peripheral helpers to the main business of teaching students. Teachers adapt these tools to help students be more productive and do a better job of what they are supposed to do in schools and the result, he says, is

that new technologies reinforce what schools have done for over a century (p20). This seems to echo the fact that most schools tend to implement ICT in order to achieve Type I objectives as they tend not to go beyond the basic practices with ICT as described by Tubin (2006).

This consistent tendency of the education system to preserve itself and its practices by the assimilation of new technologies into existing practices has been referred to as the 'technological paradox' (Salomon, 2002; p71-72). The seemingly marginal use of computers and telecommunications in schools and classrooms, Cuban (1993) argues, is due less to inadequate funds, unprepared teachers, and indifferent administrators 'than to dominant cultural beliefs about what teaching, learning, and proper knowledge are, and how schools are organized for instruction'. Evidence that makes this scenario plausible includes:

> ...mandating computer literacy as a graduation requirement; adding computer science courses to the curriculum; creating a computer lab, scheduling teachers once per week to bring their classes there, and hiring an aide to help students use the available software; placing one computer in each classroom; buying software that is part of a textbook adoption; buying an integrated learning system that centralizes daily lessons for each student with results of the students' work being reported the next day (Cuban 1993: p8).

Learning institutions and education systems can be seen as sites for both strong classification and strong framing of knowledge, which are fundamentally challenged by the destabilizing impact of ICT on concepts like knowledge, teaching, the disciplines and rationality (Somekh 2007; Cuban, 1993). Gamoran (2001) refers to the 'stable structure' of the school and the 'persisting process' of classroom organization and pedagogy, which is dominated by textbooks, lectures and recitation; instruction has remained fundamentally unchanged even though new tools have made other approaches to class work, homework and teacher-student interaction feasible.

Some studies have suggested that there is an inherent problem in expecting such radical change when those 'in the system' are deeply embedded in an existing traditional framework of assessment and statutory requirements (Tearle, 2003). A further challenge to ICT policy implementation in education threaded through the literature is resistance to change. Many studies suggest that ICTs have the potential to disrupt the routine procedures of schooling and challenge some of the basic principles which it symbolically upholds. This includes whole school characteristics and internal processes already firmly established and embedded within the school prior to the ICT implementation (Somekh, 2007; Sharples 2003; Tearle 2003).

It is suggested in the literature that teacher resistance to change with ICT may be a result of teacher attitude. Any successful transformation in educational practice requires development of positive user attitudes towards the new technology (Woodrow, 1992). Teachers with positive attitudes are more likely to transform educational practice and unlikely to resist its use in the classroom (Bullock, 2004; Watson, 1998; Berner, 2003;).

Also highlighted in the literature is the place of cultural beliefs in inhibiting change and the need to understand the complexity of the processes and culture shift required to achieve change in educational settings with ICT. Tearle (2003) argues that advances in technology mean the scope of opportunities have moved on relentlessly, so the changes in teaching and learning with ICT which have taken place may not be fully recognized and appreciated, 'as the gap between 'actual use' and 'potential use' is not being reduced since the 'goal posts' are moving at the same rate as practice' (p567). The high expectation of the role ICT could play

in schools therefore places both opportunities and challenges for those involved in its implementation and application to teaching and learning.

Resistance of educational policy change has also been attributed to fear and anxiety, and also the idiosyncratic behaviour of experienced teachers (Smit, 2005). This author argues that education policy is in the eye of the beholder, and if the beholder has initiated the policy then it is probably seen as logical, rational, and well thought out. If, however, the beholder sees policy as illogical, irrational, and improperly conceived, more than likely policy will be resisted, either implicitly or explicitly:

> Resistance to change comes mostly from teachers for whom the policy has the greatest impact. If policy feels threatening - particularly when it affronts deeply embedded assumptions about the interaction of education, power, culture, and society - then conflict may arise between those who make policy happen and those who resist it. Political reactions, mainly in transitional conditions, to policy may relate to fear of loss of rights, status, and privileges (p301).

The author further suggests that experienced teachers have their own unique understanding of education policy. Empirical data, which can be supported by the work of Sikes (1992), shows that experienced teachers present their resistance in unique ways. Many have been teaching for many years and have developed their own ways of doing things which fits with their situations. Based on the empirical data from this study, teachers are 'principally reluctant to abandon tried and tested methods for new ones', which they may be afraid will fail (p302). Younger teachers, on the other hand, tend to show more enthusiasm and commitment to change than older staff, although they may lack the skills and expertise that is necessary (Sikes, 1992: p47-50).

Resistance is an integral part of defensive approaches to life and therefore it is not something that can be easily overcome (Smit, 2005). However, overcoming it

demands that resistant behaviour is recognized and explored in order that it doesn't interfere with organizational processes (Corey,1995). Structural change is only one part and one moment in the reform process; change in consciousness, adaptation of practices, the arts of resistance and manoeuvre, values drift, will take place slowly, sometimes almost imperceptibly over a long time (Ball, 1997; Gewirtz et al, 1995).

Some researchers have faulted the research approaches that have been used to determine whether or not teachers' practices using ICT have changed. A common assumption evident in the studies investigating change in teachers' practices mediated by technology is that teachers will move along and complete a similar and predetermined linear path of change dictated from the top (Bell and Stevenson, 2006; Hill, 2005; Wise, 1986), and the use of 'before and after' snapshots by many of the studies indicates the 'techno-centric' expectation of immediacy of change in teachers' practices as a result of the use of ICT (Orlando, 2009).

The use of continuums and frameworks to measure change in teacher practice with ICT (Rakes et al., 2006) present a sequence of steps teachers' practices mediated by ICT are expected to progress along, as they move from 'undesirable' practices to those considered 'desirable'. They adopt 'a generic approach to teachers and teaching and de-contextualize the decisions teachers are making in regard to their practices with ICT' (p34). This seems to agree with other literature discussed earlier in the thesis that examine hyperationalisation in the policy development and implementation process (See: Chapter 2).

A number of studies have also used constructivism as a benchmark for measuring change in teaching practice with ICT. While the literature indicates that most

teachers' practices with ICT have not changed to constructivist ways of teaching, it cannot be assumed that they are not changing at all (Orlando, 2009). Over-reliance on particular beliefs and ways of investigating teachers' changing practices mediated by ICT have possibly resulted in the overlooking of other types of change that may be occurring and the complexity of what informs and shapes the change (Underwood, 2004; Watson, 2001).

Recent research in pedagogy suggests that if we are to understand teachers' practices and the way they change, there is a need to look beyond teaching methods and pupil organisation (Loveless, 2003). This is because teachers' practices while implementing ICT in the curriculum are a complex social and cultural construction (Loveless, 2001; Moseley et al., 1999; Renshaw, 1998). Teachers are 'embedded in and constituted by a matrix of social relationships and processes' (Renshaw 1998, p84). And in the case of teachers' practices with ICT, these are further complicated by the unique nature of ICT and its place in the society (Orlando, 2009).

This unique nature of ICT raises the possibility of ICT changing things in ways that were initially unanticipated (Bigum, 2002): Rather than necessarily improving an existing set of circumstances for example, the teaching of Geography, this author observes that we might expect the teaching of the subject Geography to not only change with the deployment of ICT, but also to be changed 'in unpredictable ways' (p131). This implies that the teachers may not necessarily use constructivist approaches but the use of ICT might still lead them into teaching in ways that were not anticipated in the first instance, raising the challenge of where exactly to focus while evaluating ICT implementation in teaching and learning.

The same argument is raised in a study by Austin et al (2003), who dispute constructivist-style teaching as a benchmark for investigating ICT implementation in the curriculum. The outcome of their study suggests that although teachers do not change to a constructivist style of teaching, ICT-focused projects initiate for the teachers new ways of reflecting on their teaching practices as well as stimulates their enthusiasm for trying new teaching strategies.

Also prevalent in the literature is the challenge of recognising and dealing with 'implementation dip', which is the tendency for the early phases of change to be associated with a drop in productivity (Fullan, 1991: 90). There are several proposals for ways of dealing with the implementation dip, one of which is to provide clear strategies that target the social, cultural and institutional dimensions of ICT, as well as the teachers' beliefs around their identity in an ICT implementation matrix (Orlando, 2009).

Others propose that to reduce the potential effects of the implementation dip, teachers need to be provided with individualized support through the process of change (Sachs 1999; Brandt 2003; Gerber 1998). It is also important to provide emotional, psychological and logistical support to teachers for them to continue developing new habits during the implementation dip, that reduces effectiveness before the new procedures become routine (Sparks, 2000; Somers and Sikorova, 2002). Key is recognizing that there is typically an implementation dip, redefining resistance and changing cultures (Warwick and Swaffield, 2006).

3.4 Conclusion

This chapter of my study has delved deeper into ICT policy implementation in educational settings, with a focus on possible influences on practices with ICT in teaching and learning. I have reviewed perspectives in the research literature that focus on ICT for teaching and learning in schools, ICT policy and teacher preparation, and challenges to ICT policy implementation in educational settings. The body of literature reviewed in this chapter and the previous chapter has been that of relevance to policy interpretation and implementation that will inform the analysis framework in Chapter 8.

The key ideas arising from this review are:

- A number of teachers and teacher educators in many contexts with access to ICTs have yet to change their teaching practice. The work of Cuban, Somekh and others suggest that resistance to change persists in ICT implementation in education. Cuban's work particularly shows that there is the tendency of ICT to reinforce rather than transform old practices in education. The structures, beliefs and practices in schools in developed and developing countries tend to remain the same in spite of the heavy investment on ICT infrastructure. This theme does appear to provide a basis for analysis of the situation in Kenya.

- From the work of Cuban, Smit (2005), Wong and Li (2008) and others, it appears that the expectation that ICTs will help in meeting new challenges in learning and teaching, and also transforming teaching is still far from realisation both in the developed and developing countries. The literature suggests that teachers often use ICTs in the usual traditional ways that only

allow for the attainment of the same old objectives of learning. Even when teachers suggest that policy changes desired with ICT have been implemented, the gap between rhetoric and actual practice is often wide.

- The work of Fullan, Tubin and others suggests that ICT policies in teacher education are often inexistent, neglected and ill-developed, without any clear implementation strategies. Whereas teachers and teacher educators are recognised as key implementers of ICT policy in the body of literature reviewed, it appears that they tend to lack the necessary training to enable them use ICT in transformative ways.

- The use and implementation of ICT in schools has been identified in the research literature as a two-step process where the first phase involves the rationalization of administrative routines, communication and transmission of knowledge, without any serious impact on pedagogy and teaching traditions, and it is only in the next phase that pedagogical structures and ways of thinking may be challenged. This seems to provide a possible analytic framework for the situation in Kenya.

- The concept of the implementation dip discussed by Fullan and others is an idea in the literature that might help explain some strategic challenges in ICT implementation in education in the Kenyan context.

CHAPTER FOUR: METHODOLOGY

Overview of research methodology

The Kenyan story of policy development around ICTs and teacher education represents a particular example and context. This specific 'case' is understood here through an interpretive historical approach (Kalberg, 1994). Empirical data, including across phases of development, is gathered from a variety of sources and reconstructed to delimit a number of concepts or key ideas. Such an interpretive historical approach focuses upon the accurate construction of concepts and reconstruction of cases. The detail, including the chronological narrative, then becomes the basis for generalisation which grows from a sequence of preliminary key ideas established through a scrutiny of the literature (See Chapters 2 and 3). The Kenyan case is a unique exposition which could serve as a basis for comparison with other such 'cases' and for analytical scrutiny in relation to the wider understanding of policy processes in developing country contexts.

The methodological approach, using this stance, therefore proceeded through three phases; first, a preliminary documentary analysis; then interviews with key participants in the ICT and education sectors; and finally, more detailed case studies to interrogate the data drawn from the documentary analysis and the interviews. The study was historically specific and covered the 10-year period between 1997 and 2007. It was important that the study be delimited in time in order to define a particular scope of focus, and present a penetrating analysis of a limited problem (Best, 1970).

The documentary analysis was carried out to establish the ICT and educational policies of relevance to ICTs in teacher education, what characterised them and how they had evolved. This analysis covered policy documents and documentation of other relevant policy initiatives in the post independence Kenya, beginning in the mid 1960's to enable me to draw a background of the ICT policy making process in Kenya and to explain the evolution of some of the emerging characteristics of ICT policies relevant to education in the study period. The documents analysed were purposively sampled based on availability and perceived relevance (Mugenda and Mugenda, 1999), and included national and institutional ICT policy documents, educational policy documents, strategic plans, assessment reports, and other related literature that was considered significant for the study. The outcome of this analysis was themed to provide the basis of investigation in the subsequent stages of the study, particularly the design for the Interview Guides (Appendices 2 and 3).

In order to address the threats to validity in the documents that would have arisen from selectivity, attrition and selective survival (Ozga, 2000), the documents were interpreted within their context. They were viewed as situated products that needed to be understood in the context in which they were written (Prior, 2003). I corroborated the documents available with other related documents such as publications linked to policy process and information from respondents in the interviews to ensure a high level of validity (Tellis, 1997). Through corroboration, I ensured that the documents were authentic, representative and available, thereby attaining reliability as well.

In stage 2, I conducted interviews with key participants with a purposively sampled population to establish the participants' perspectives on the ICT policy evolution

process and the perceived influence of these policies, and other related factors, on practice in teacher education programmes in Kenya in the study period. Interviewees were drawn from teacher education institutions and state institutions such as the Ministry of Education, KIE, Ministry of Information and Communications, and the Communications Commission of Kenya (CCK). I collected data using the Interview Guide in Appendix 2.

Finally, I carried out an in-depth 3-case multiple case study: each case had two embedded units of analysis (Yin, 2004). I felt that investigating these cases would lead to better understanding about a larger collection of cases. The embedded units would provide a deeper understanding of the possible influences on the practices evident in the teacher training programmes and the perceptions of the teachers and teacher educators of their own practices subsequent to the ICT training. Each case was representative of a type of teacher education programme.

I used the case studies to uncover the real detail of the experiences of the teachers, teacher educators and other players in these specific teacher education programmes in various contexts. Evidence was gathered through key informant interviews, institutional policy documents and other relevant documents.

I analysed data using content analysis techniques. The process of establishing relationships and patterns was informed by concepts arising from the literature review, and also from the themes that were intrinsic to the data. Having established the ICT and related policies that specifically addressed ICTs in teacher education in the period 1997 – 2007 under various themes, an analysis was carried out of the possible relationships between these policy themes and the emergent practice by the participants in the Case programmes.

4.1 Documentary analysis

Many of the documents studied were national and institutional policy documents and strategy papers which Bailey (1994) refers to as documents in the public domain. In a study with a historical dimension like this one, it was hoped that such documents would enable me to reach inaccessible persons or subjects, and that these documents would also render more visible the phenomena under study (Bailey, 1994; Prior 2003) - policies of relevance to ICT in teacher education.

At various stages of the study, therefore, I undertook an analysis of the following documents:

- National ICT policies, education policies and related documents
- Organisation policy documents. This was applicable where a non-state actor like an NGO was involved in teacher education programmes and therefore had their own organisational policy documents; and,
- Institutional policy and related programme documents

The focus remained mainly on national ICT and education policy documents since few organisational, institutional and programme documents existed in many of the institutions under study. The national policy documents included Acts of Parliament, strategy papers and sessional papers. The study did not focus solely on formal policy texts and government legislation, but extended the policy text category to include documentary or other materials that could be 'read as significant within the discursive parameters of the investigation' (Ozga, 2000: p95).

I carried out an analysis of various existing policy documents, reports and other related literature to establish how Kenyan ICT policy of relevance to ICT in teacher

education evolved and its characteristics at various stages. These characteristics and the various national and international influences on the ICT policy development process are reported in Chapter 5.

Where available, institutional policy documents that addressed ICT use in teacher education were also analysed to establish the extent to which these documents represented an interpretation of the national or organisational ICT policy intentions as well as other influences on the institution policies. Of specific interest were the teacher training curricula and training materials used in various teacher training programmes. This helped in identifying the extent to which teacher training curricula and the attendant training material represented an interpretation or otherwise, of the national ICT policy in specific teacher education programmes. Appendices 4, 5 and 6 show summaries of the curriculum followed in each of the 3 Case programmes.

4.2 Interviews with key stakeholders

The focus of the interviews with key stakeholders was to establish a description of the participants' perceptions on the development of ICT policy of relevance to teacher education, possible influences, including national ICT policy , on practice linked to use of ICTs in various teacher education programmes in Kenya and practices with ICT in various teacher education programmes and contexts.

These included practices around ICT infrastructure and technologies in teacher education institutions, ICT based in-service programmes for teachers and teacher educators, and efforts at ICT integration in teacher education in various teacher

education programmes. The interviews identified further policy documents that influenced ICT use in teacher education programmes in Kenya

The target population for interview included individuals and institutions that were likely to have primary and secondary information on ICT policies and teacher education over the study period. Such individuals included officers at the Ministry of Education in charge of teacher education and also those in charge of ICT in education, as well as current and former officials at the Ministry of Information and Communication who had information on ICT policy development and its possible influences on the education sector in Kenya during the study period.

At the KIE, which is the main curriculum development centre in Kenya, the study drew information from the Head of Education Media Services (EMS) and the Head of the Teacher Education Division. A member of staff involved in the development of eLearning materials for teacher training colleges was also interviewed. Other respondents were drawn from teacher training colleges, a diploma teachers college and a cross-section of universities. I initially set out to interview some 10 purposively sampled people whom I felt adequately represented a cross-section of players in ICT in teacher education. However, I eventually interviewed slightly over 20 people, many of whom were recommended by their colleagues.

In a snowballing approach, my sampled respondents suggested other respondents whom they felt might have more information than themselves and could have otherwise been difficult for me to identify and locate. Since ICTs, especially the new ones, were still a relatively new phenomenon in the education sector, key informants made suggestions on who else might be good informants on the aspect under study, and I interviewed the next informant on the basis of this suggestion.

The perceptions of these participants on the possible ways in which ICT policy had influenced current practice in various teacher education contexts were collected and analysed. This analysis was drawn on to determine the institutions that would potentially yield informative case studies (Mugenda and Mugenda, 1999).

4.3 The Case Study

In a qualitative study such as this, I expected the case study to provide a deeper insight into practices in teacher education programmes at institutional level. Koul (1984) suggests that the case study complements other data sources since the case study is narrower in scope but more exhaustive and more informative in nature. This study involved an in-depth look at case studies conceptualized through the documentary analysis and interviews with key participants. Each case was selected to serve a specific purpose within the overall scope of the inquiry (Yin, 2003). Various external possible influences on ICT policy and practice in teacher education programmes were put into consideration.

I adopted a 3-case multiple case study. Evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust (Herriot and Firestone, 1983). Each case was described in detail and analysed to provide evidence that would help bring out a detailed, particularistic and contextual understanding of the extent to which ICT policy influenced practice in teacher education in Kenya. This was in line with the historical interpretive approach adapted for the study, which attaches a lot of significance to context as an important contributor to the way people construct meaning (Peshkin, 2000).

I used the following criteria in selecting the 3 case programmes which all involved ICT components in teacher education programmes:

a) The initiator of the programme: whether led by national government, international body or institution led

b) Type of programme: pre-service or in-service

c) The date or period of inception of the programme

d) Main focus of the overall project, as established in the interviews with the key persons e.g. the type of teacher training curriculum with regards to ICT; institutional or centralized national curriculum

e) Availability of programme or project documentation

f) Availability of potential interviewees representing different cadres of staff

g) Potential contribution of cases to the research questions

The detailed Case Study matrix expounding on the criteria above can be found in Table 2 below:

Table 2: The Case Study matrix showing criteria for choice of individual cases

	Case 1	Case 2	Case 3
	NEPAD e-schools Project	**Primary Teacher Training College**	**Computers for Schools -Kenya (CFSK)**
Implementation Approach	A regional project implemented by the government of Kenya through the Ministry of Education. An officer at the Ministry who had been in charge of Computer Education was appointed the Country Liaison Person (CLP) for the project.	Teacher Training Colleges began to offer ICT skills courses for pre-service teachers using internal curricula, supported by the college Principals and the college Boards of Governors. The funds that were used to set up the infrastructure were raised from an extra levy that was charged on the students. In many instances, the project fitted under the administration of an older project, the Learning Resource Centre, which had itself been a project initiated in all TTCs by the government with support from the World Bank in the 1980s.	A Non-Governmental Organisation that modelled its implementation around Computers for Schools-Canada. Works directly with schools. Had own internal policy guiding its operations, with some consultation with the Ministry of Education.
Date of Inception	2005 First phase was implemented in 8 demo-schools. This phase would be concluded in 2007.	2002 The internal curriculum was skills based and was used in 2002 and 2003. In 2004, the Ministry released a national syllabus to be followed in all primary teacher training colleges.	2001 Programmes have, to date, been running consistently in various partner schools across the country.
Main Focus	Provision of Internet connectivity and e-content for selected **secondary schools** in Kenya.	ICT skills training for **pre-service teachers**	Provision of computers to **secondary schools** in Kenya.
ICT and Teacher Education Component	Teachers trained on ICT skills and ICT Integration skills in their various subject areas.	Pre-service teachers were trained on ICT skills. Later, in 2005, KIE released an ICT Teaching Guide, which included components in ICT integration in education. This had been missing in the syllabus previously published.	Teachers trained on basic ICT literacy skills, computer maintenance and later on, ICT integration in their various subject areas.
Documentation for possible analysis	Programme policy documents, curriculum, reports and related documentation on ICT policy and ICT in teacher education	ICT syllabus for teacher training colleges, ICT Teaching Guide for primary teacher training colleges, other institutional policy documents, departmental reports	Policy documents, curricula, reports and related project documentation on ICT policy and ICT in teacher education
'A' Interviews (High level	• The NEPAD e-schools Country Liaison Person (CLP)	• Head of Teacher Education – KIE • Head of ICT – Kenya Institute of Education	• The Director - CFSK • The Deputy Director - CFSK

	Case 1	Case 2	Case 3
	NEPAD e-schools Project	**Primary Teacher Training College**	**Computers for Schools -Kenya (CFSK)**
Ministry / top level administration)	• 1 officer at the NEPAD Secretariat • E-learning Officer - Ministry of Education • An officer at the Policy and Planning Department	• Chairman - Kenya Teacher Training Colleges Principals Association • Ministry of Education official in charge of Teacher Education	• Head of Teacher Education Programmes – CFSK • Manager – Research, Monitoring and Evaluation - CFSK • Head of eLearning – Kenya Institute of Education (KIE)
'B' – Interviews (School/College Level)	• Principal of NEPAD e-school • The ICT Champion • 4 teachers representing various subject groupings i.e. the Languages, the Humanities, the Sciences and the Technical subjects.	• Principal of Teachers College • Dean of Curriculum • Head of LRC Department • Head of ICT Department	• Principal CFSK Secondary School • Head of ICT Department • 4 teachers representing various subject groupings i.e. the Languages, the Humanities, the Sciences and the Technical subjects.
Contribution to Research Questions	The case will help find practices that are evident in ICTs in teacher education programmes between 1997 and 2007 and the factors that give rise to them. It will help establish the ways in which government legislation in ICT has influenced (or failed to influence) practice in teacher education, including content and delivery medium. The documentation obtained will also provide evidence on the way in which the national ICT policy and related statutes have been interpreted at institutional level in	The ICT Project at the Teachers Colleges was launched in 2002, when there was neither an ICT Strategy for Education nor a national ICT policy. All 21 public primary teacher training colleges had ICT programmes running in various forms. According to data drawn from the interviews with key persons, there was some ICT training activity in colleges that was sustained through to the time that a national curriculum was published. The case will focus on the ICT curriculum and its deployment at the TTCs before and after the publication of the national curriculum and the teaching guide. This will give answers as to the ways in which this step by the Ministry changed (or failed to change) the way in which teachers were being trained at the TTCs with regards to the ICT	Since CFSK was launched way before there was a National ICT policy, it will provide useful insight into the factors other than national ICT Policy discourses that influenced the practice of teaching, teacher education and professional development within the CFSK institutions.

	Case 1	Case 2	Case 3
	NEPAD e-schools Project	**Primary Teacher Training College**	**Computers for Schools -Kenya (CFSK)**
	this model.	infrastructure, the content of their ICT course, learning activities that they were involved in, other resources that were used in their training. This case will investigate internal factors that drove the training programs for the pre-service teachers before the national ICT syllabus was released and how the national curriculum and teaching guidelines or other factors changed (or failed to change) practice at the TTCs.	

Case 1 was the NEPAD e-schools programme; Case 2 involved the Primary Teacher Training Colleges; and the last was the Computers for Schools Kenya programme (CFSK). Case 1 and Case 3 had an institution-based cascade model of training: the training activities for the teachers took place within the institutions where they worked. Case 2, on the other hand, was a college-based pre-service teacher training programme. Each of the three cases selected had two embedded units of analysis as shown in Table 3 below:

Table 3: The embedded units of analysis in the Case Study

CASE 1 NEPAD e-schools programme		CASE 2 Primary Teacher Training College		CASE 3 Computers for Schools Kenya (CFSK) programme	
Unit 1 High School **Case 1.1**	**Unit 2** High School **Case 1.2**	**Unit 1** Primary Teacher Training College **Case 2.1**	**Unit 2** Primary Teacher Training College **Case 2.2**	**Unit 1** High School **Case 3.1**	**Unit 2** High School **Case 3.2**

Summary of the Case characteristics

1. The NEPAD e-schools initiative, whose demo phase lasted between 2005 – 2008, provided infrastructure, internet connectivity, digital content and teacher training on ICT skills in eight secondary schools in Kenya. The primary objective of the NEPAD e-schools project was to introduce eLearning in secondary schools in Kenya. A case study involving teachers from the NEPAD e-schools demo schools would be helpful in bringing in perspectives on the practices in the NEPAD e-schools teacher education programme in Kenya, having been initiated by African Heads of State as part of a broader Pan African development initiative.

2. A number of public primary teacher training colleges in Kenya had been offering ICT skills training to pre-service teachers before the government published an official national curriculum in the year 2004. By 2002, each of the 21 public TTCs had set up computer laboratories funded by a government grant. Inclusion of the primary teacher training colleges in the study sample would give insights on the extent to which the existence of an official national ICT curriculum for pre-service teachers and the ICT infrastructure, mainly stand-alone computers without internet connectivity, influenced practice in mainstream teacher training.

3. The Computers for Schools-Kenya (CFSK) teacher education programme was selected as one of the cases because CFSK was a Non Governmental Organisation established in 2001. The primary focus of the CFSK had been to provide computers to secondary schools and also teacher education institutions. Its mandate later expanded to include provision of in-service training in ICT skills and ICT-subject integration skills training to teachers in partner secondary schools.

Owing to its versatile nature as a research method, the case study may employ any or all methods of data collection (Hancock, 2002). In this study, key informant interviews and documentary analysis were both used in order to assure multiple sources of data, thereby attaining the depth of data required and also for purposes of triangulation.

Evidence in the case studies was therefore pursued in two strands; the first strand aimed to establish policy intentions in each case through analysis of policy documents and interviews carried out with key informants drawn from top- level organizational and institutional leadership in all three cases. The evidence from

these interviews was used to triangulate both the documentary evidence and also evidence that would later be drawn from the implementing institutions' practices.

The second strand aimed at finding out the practices in the case institutions, and drawing possible links between these and the policy intentions established in the first strand. The study did not focus exclusively on policy decisions which produced change but also those that resisted change 'since the concept of policy denotes deliberate choice of action or inaction' (Smith,1976: p13).

Perspectives captured at institutional level included the administrative perspective, ICT implementation perspective, general curriculum implementation perspective and subject teaching perspective. Texts and discourses in the institutions were also investigated. It was expected that an analysis of the data emerging from this second strand would show the extent to which the practices, texts and discourses in the case institutions represent various understandings of the policies identified in the first strand. Respondents interviewed for this strand are shown in Table 3 below.

Table 4: Respondents interviewed at the institutions and documents analysed

Perspective	**NEPAD e-school** C1	**Public PTTC** C2	**CFSK School** C3
Administrative	• Principal of Institution • Chairman – Board of governors	• Principal of Institution • Chairman – Board of governors	• Principal of Institution • Chairman – Board of governors
ICT implementation perspective	The ICT Champion	• The Head of Learning Resource Centre • Head of ICT Department	The Head of ICT Department
General curriculum implementation	Director of Studies	Dean of Curriculum	Head of Academic programmes

	NEPAD e-school C1	Public PTTC C2	CFSK School C3
perspective			
Subject teaching perspective	2 teachers representing different subject groupings	2 teachers representing different subject groupings	2 teachers representing different subject groupings
Institutional ICT Policy Documents	• An assessment report	• College Strategic plan • Performance contracting document • Pre-service ICT teaching guide	• School ICT policy • Teacher training curriculum / kit • Project report(s) • Documentaries

Unstructured interviews, also known as 'depth' or 'in-depth' interviews (Hancock 2002), were used to gather data in the case study institutions. These interviews enabled me to elicit as much information as possible from the key informants. The interview schedule had a set of broad questions to guide the interview. This choice was considered appropriate owing to the multi-dimensional aspect of the topic of investigation involving insights on teacher education policy and practice, ICT policy and on-going teacher education programmes. The data obtained from the cases, therefore, represented the participants' own experiences and perspectives, which fitted with interpretive model of research that consider people as a key source of data (Creswell, 2009).

I asked additional questions based on the ideas and concepts that emerged from the responses provided by the participants. These allowed participants to shed more light on their perspectives about the ways in which ICT policy had determined or failed to determine the way that they carried out their responsibilities at the institution. I used both prompts and follow-up questions to help obtain clarity and detail. An in-depth analysis of these cases helped corroborate the findings from the documentary sources and the interviews with key participants, thereby ensuring reliability in the study

4.4 Data transcription and analysis

In this study, I used thematic analysis to enable me to arrive at categories for the data collected through the documentary analysis, interviews with key stakeholders and also in-depth interviews with key people in the three Case programmes. Thematic analysis is an approach to dealing with data that involves the creation and application of 'codes' to data. Some studies have observed that thematic analysis is a versatile method that does not require any pre-existing theoretical framework, and therefore it can be used within different theoretical frameworks (Braun and Clarke, 2006). Thematic analysis enabled me to identify, analyse and report patterns within the data generated in the study. This was particularly necessary because I had a large amount of data from different sources (Jwan, 2009).

I familiarized myself with the data by conducting the in-depth interviews and transcribing the data myself, in line with the proposal made by Howitt and Crammer (2005), who suggest that it is vitally important that the researcher be extremely familiar with their data if the analysis is to be expedited and insightful. These authors add that data familiarization is a key to thematic analysis as it is for other qualitative methods.

I first developed categories of data by examining the documentary data drawn from the policy documents . At this stage, I undertook open coding, by developing categories of information from the data - the policy texts and interview transcripts. Besides the themes emerging from the documentary anaysis, I drew from the research literature and the transcribed data to come up with the a priori codes.

Through coding, I created categories in relation to the data and grouped together different instances of data that illustrated given patterns. The patterns were informed by the themes and initiatives in the documentary analysis, the research literature and also the data itself. I put together all the aspects of the data from the documentary analysis that showed the different themes that I had arrived at through open coding (Howitt and Crammer, 2005).

The themes that had emerged from the data included:

1. ICT infrastructure in Teacher education
2. ICT integration/infusion in Teacher Education Programmes
3. Teacher capacity building in ICT
4. Digital Content / e-learning materials / Web portal
5. ICTs for flexible / distance/ life-long learning/ ODE / virtual learning among teachers
6. ICTs for teacher-to-teacher communication and collaboration
7. ICTs for actualisation of the e-school concept
8. ICTs for Research and development in teacher education
9. Institutional ICT policy
10. The external environment relative to the teacher education environment

Since my study was looking at the policy-practice interface, I used relational coding to try and establish links between policies and practices drawn from the interviews and the policy themes. I then built a story that linked the various categories that I had arrived at (Creswell, 2007). It was also possible to isolate practices that had no explicit links with policy statements and were therefore the outcome of other factors.

I used Nvivo8, a data analysis software, to ease the thematic presentation of data and the retrieval of these later on. This software facilitated the allocation of data into various categories and the retrieval of the same. Nvivo8 not only allowed me to categorize codes, but also assigned second level codes that created a

hierarchical category scheme. This eased the visualization of the themes drawn from the different types of documents and also those emerging from the interviews with key persons and the in-depth interviews with participants in the Case programmes. Possible influences on teacher education practice with ICTs were drawn from the data under appropriate themes.

4.5 My role

I was a lecturer in one of the teacher training colleges in Kenya at the time of starting my PhD. I had also undertaken some national and international assignments in ICT curriculum development and also ICT resource evaluation, some of which were published as part of the national curriculum and also as recognised international reports.

Since I was undertaking the study in an environment where the participants considered me as a colleague, it was important that they understood my role as a researcher in the context of this study. To facilitate this, I gave details about my study in the letters that I wrote seeking their consent to participate in the study. I also assured the participants that the information they gave would remain anonymous. After transcribing the data, I gave the respondents access to the transcripts to establish that the information that they gave had been accurately represented.

Owing to my previous work with DFID as a researcher in ICTs in Education, resulting in a co-authored publication '*Evaluating digital learning materials for English Language Teaching in African Primary Schools*' (Clegg, Ogange and Rodseth, 2003) and also my work with the curriculum development centre KIE, I

recognised the fact that some participants might give certain responses during the interviews because of what they might perceive to be my understanding, position and views of the possible role of ICTs in education both locally in Kenya and in the wider African context. Eliminating this influence completely would have been impossible and it was therefore important to understand the influences at play and to use them productively (Maxwell 1997; cited in Hutchinson, 2008).

Some participants felt that giving their opinion might have a direct influence on the national curriculum and contribute to international discourse on ICTs in education because they perceived me as one of their own, who had made a direct input on national curriculum development. A record of this role is found in the acknowledgement page of the *Information and Communications Technology Teaching Guide for Primary Teacher Training Colleges* by the Director KIE, that reads in part:

> I acknowledge the contributions of various persons and institutions to the successful completion of this Guide. Special thanks to ... of ...Technical Teachers College and Betty Ogange of ...Teachers College, for enriching the Teachers' Guide with pedagogy and particularly, the use and integration of ICTs in education (KIE, 2005: pii).

The existence of a hierarchical structure of power in the Kenyan education system, where teachers get to know about government policy through circulars sent by the Ministry of Education through the Head of the institution, would have led to some difficulties interviewing teachers if they had perceived me as 'an outsider' associated closely with the high ranks at the Ministry of Education. Instead, their perception of me merely as one of them who would give them a voice in the policy issues around ICTs in education, motivated them to speak openly with me. My background and previous roles therefore foregrounded the discussions and the

participants were more ready to reflect deeply upon their training in and practice with ICT than they would do with someone else.

4.6 Conclusion

In this chapter, I have given a description of my research methodology. The key issues in this chapter include:

- The study adopted a historical interpretive approach that engaged in historical and contemporary analysis of the ICT policies and practices in teacher education
- The study used a three-phase methodological approach that involved documentary analysis of the national and institutional policies, interviews with key stakeholders and in-depth interviews with participants in the Case programmes which were selected to capture the participants' own perceptions of the possible influences on practice in teacher education, including national ICT policies.
- Data was analysed using content analysis techniques, which involved establishing relationships and patterns in the data as informed by concepts arising from the literature review, and also from the themes that were intrinsic to the data. The possible relationships between these policy themes and the emergent practice in the Case programmes and institutions were drawn.
- Influences other than policy, on ICTs in teacher education programmes and teaching were also drawn from the data.

CHAPTER FIVE: DOCUMETARY ANALYSIS

Introduction

This chronological analysis of documentary evidence covers the evolution of ICT policies and related initiatives of relevance to education in general and teacher education in particular in post-independence Kenya, beginning in the mid 1960s. I review formal policies originating from international and national levels of policy development in Kenya (See: Chapter 1) and institutional policies and other ICT initiatives in the implementation hierarchy that might reflect certain influences other than the formal policy statements.

From the documentary analysis, the evolution of ICT policy and practice in the education sector in Kenya can be seen to fall in three phases. The first is the Early Telecommunications Broadcasting and Education phase from 1964 to 1989. This pre-1989 phase saw the prevalent use of the radio, initially as a source of supplementary material for in-service teachers and primary school pupils, and later as a core resource that was used to teach English in lower primary school. A number of Acts of Parliament that regulated the education, telecommunications and broadcasting sectors were enacted in this phase and tended to be sector-specific, although there are examples of cross-sector collaborations. For instance, the Ministry of Information and Broadcasting played a key role in the realization of the radio programmes in the education sector. The telecommunications, information and broadcasting policies around this time are initially influenced by the structures of the regional East African Community and later by the need to develop in-country policies in line with the country's national and education goals.

The second phase falls between 1990 and 1999, and appears to be influenced by regional and international efforts aimed at harmonizing ICT policies across the continent. This phase exhibits a more integrated approach to ICT policy making, with ICT being seen to play an enabling role for the realization of socio-economic growth. It also marks the beginning of liberalisation of the telecommunications sector in Kenya and the establishment of an independent regulator, the Communications Commission of Kenya (CCK) in 1998. The establishment of the CCK leads to the launch of one of the earliest cross-sector initiatives involving the provision of internet connectivity to institutions of higher learning and tertiary institutions. This is very significant to my study as it demonstrates a changing understanding by government on the necessity of cross-sector collaboration between the information and communications industry and the education sector, showing an interplay of influences on ICT in education.

The final phase, post-1999 sees an ICT policy making process that is grounded in the global focus on ICT policy development, with the support of donor organizations. ICT policy is developed in the context of the larger development context as a means to poverty reduction and promotion of economic growth. This is also in line with the World Bank and International Monetary Fund (IMF) requirements for the Poverty Reduction and Growth Facility (PRGF). The Internet is considered an important tool in this process. Educational ICT policies recognise the role of ICT in promoting innovation and sustainable growth. As a result, there is a general move towards policies that promote the integration of ICT in the curriculum, provision of the supporting infrastructure, e-learning and e-government.

5.1 Pre 1989: Early telecommunications, broadcasting and education

At independence in 1963, the immediate priority of the government of Kenya was to develop an education system that would fight ignorance, poverty and disease by enhancing socio-economic growth and cultural development in the country. As indicated in the *Sessional Paper No 10 of 1965*, Kenya was transiting from a subsistence to a monetary economy, from economic dependence on agriculture to a more balanced economy, from a development of natural resources for 'others' to a development of human and natural resources for the benefit her citizens:

> The best of Kenya's African social heritage and colonial economic legacy must be reorganised and mobilised for a concerted, carefully planned attack on poverty, disease and the lack of education in order to achieve social justice, human dignity and economic welfare for all (Republic of Kenya, 1965: p1).

In order to adapt the education system to fit with the emerging national goals of post independence Kenya, a number of commissions and working parties were formed. The first of these, the Kenya Education Commission of 1964 (also known as the Ominde Commission) published *The Kenya Education Commission Report* (also known as The Ominde Report). Radio was explicitly noted as a significant tool to support adult education. Paragraph 373 of this report indicated:

> We attach considerable importance to the use of radio as a medium for adult education. Its coverage is nation-wide and radio sets are now found widely in homes in the rural, as well as urban areas of Kenya...It Is important to give careful thought to the possible co-ordination of different media, in order to reinforce the effect of each. It may be well that the relative cheapness and great penetrative power of the sound radio as an educational medium will be seen...to be so significant as to justify the increasing investment in this medium (Republic of Kenya, 1964a: p104).

This report is the first recorded proposal for the use of radio and correspondence education by the Ministry of Education. In paragraph 379, the commission noted the potential of radio for improving the skills of teachers:

> One development which...deserves careful consideration is the provision of certain courses supported by radio broadcasts...The combination of lessons by radio with an approved correspondence course will greatly add purpose and content to the former and at the same time encourage regularity in home study. Group listening...by teachers would be worth considering in appropriate cases (Republic of Kenya, 1964a: p105).

The Voice of Kenya (VOK), which was the national broadcaster, was subsequently established in 1964 as a government department in the Ministry of Information and Broadcasting. School radio broadcasts for pupils in primary schools were initiated in the same year and were broadcast through the VOK. These school broadcasts for pupils were developed as a national strategy to improve educational standards, widen access to education and improve teacher quality (Odera, 2006).

In April 1964, the Kenya Institute of Education (KIE) was established to coordinate the many institutions that had variously emerged to train teachers and to coordinate examinations for teachers. Two years later, the Curriculum Development and Research Centre (CDRC) was formed as a merger between three teaching centres that had variously been established as research units, to devise ways of improving the teaching of English, Mathematics and the Sciences. In the same year, 1966, the KIE and the CDRC merged to form a newly expanded KIE. The CDRC therefore had a very short lifespan.

The Correspondence Course Unit was established at the University of Nairobi in 1967 as an outcome of the Ominde Report and was initially funded by the USAID. This department was later re-named the Department of Distance Studies, to reflect the integration of other non-print supportive technologies and media, particularly radio and audio-tapes, to support learning at a distance. The department formed part of the College of Education and External Studies at the University of Nairobi. This department would later play a significant role in the production of training materials for in-service teacher education courses.

The KIE was legitimized by the Education Act Cap 211 of 1968 (Republic of Kenya, 1968). Its main objectives included designing and developing curriculum for all levels of education and training below the university, producing learning resources in print, audio and video, and conducting in-service training for teachers and trainers on new curriculum and trends in education and training. KIE would take a leading role in the production of radio programmes involving both teachers and pupils.

In 1969, KIE partnered with the Department of Distance Studies at the University of Nairobi to jointly produce radio lessons for a 3-year in-service course for untrained primary school teachers. The learning media package consisted of a print correspondence component - 75% of the total course content - supported by radio lessons that were broadcast over the VOK. Face-to-face residential sessions were organised by the Ministry of Education in conjunction with the primary teacher training colleges for a total of 7 weeks a year spread over the school holidays in April, August and December.

Radio lessons were broadcast following a broadcast schedule that would be sent to the teacher alongside the other materials developed at the University of Nairobi. The broadcasts supported and reinforced the correspondence component and were found to help in motivating and giving pace to the teachers (Kinyanjui, 1973). Of significance to this study was the involvement of the University in producing learning resources for and training primary school teachers during this period, a role that would diminish with the years as the focus of university activity turned to provision of Bachelors degree qualifications to 'convert' primary school teachers to secondary school teachers.

Around the same time, the posts and telecommunications sector in Kenya was governed by a larger regional East African Posts and Telecommunications Corporation (EAPTC). This was an umbrella organisation that had been formed in the 1960s to manage the posts and telecommunication infrastructure for the East African Community (EAC), a body that aimed at strengthening the ties between the member countries through a common market, a common customs tariff and a range of public services aimed at fast tracking balanced economic growth in the region. Telecommunications policy at the time was therefore driven by larger inter-territorial structures that determined government decisions for various sectors.

In May 1976, the functions of the KIE were redefined in the Kenya Institute of Education Order in the Legal Notice No 105. The School Broadcasting Division of the Ministry of Education, which had been attached to the VOK at the Ministry of Information and Broadcasting was incorporated into KIE and expanded into an Education Media Service (EMS) division (Republic of Kenya, 1976). This relocation meant that the responsibility for the production of multimedia learning resources to be broadcast through radio and TV remained solely with the Ministry of Education, through the national curriculum development centre, KIE. The radio programmes were designed for primary schools, secondary schools and teacher training, while the TV programmes targeted secondary schools and teacher training (Kenya Institute of Education, 2005; Kenya Institute of Education 1997).

In 1977, the East African Community collapsed following political differences between the member states. The regional governing structures were rendered ineffective and the need to formulate country-specific legislation was inevitable. The University Council was the only entity that would survive the break-up of the

larger East African Community and has continued to function as an integrated co-ordination body for higher education in East Africa.

In the years that followed, the government legislation, policy and decision making processes were separately regulated by the education, postal and telecommunications and the broadcasting sectors. The Kenya Posts and Telecommunications Corporation (KPTC), for instance, was formed by an Act of Parliament, KPTC Act in 1977, subsequent to the collapse of the EAC. As the national telecommunications operator, the KPTC monopolised the delivery of telecommunications services. The KPTC Act did not however outline any ways in which the telecommunications sector would relate to or facilitate activities in the education sector; there were no direct links between the telecommunications sector and the education sector.

A related statute that was also published in 1977 was the Science and Technology Act, Cap 250, which established the National Science and Technology Council (NSTC). The council's primary role included:

> ...considering and advising the government generally on scientific activities including science education, not only in terms of the quality and quantity of potential manpower training but also at lower levels on general science education for the public (Republic of Kenya, 1977).

At the time, the council was based at the Ministry of Research, Technical Training and Technology (MRTTT). The advancement of science and technology, under which ICT fell, was viewed as a core national priority that would enable the Kenyan population to improve its livelihood, an objective that continued to drive the ICT policy making process even in the post-1989 era. This is significant for this study as it provides a background to the role that the MRTTT later played in the national ICT policy development process in subsequent years.

In 1977, the 3-year in-service course for untrained primary school teachers that had been initiated in 1969 was suspended, despite the increasing demand for more trained teachers (Odumbe, 2007). Some of the challenges that led to the suspension included problems with radio reception in some parts of Rift Valley, and difficulties in ensuring that the correspondence material reached the teachers (K24)[4]. This suspension has also been attributed to over-dependence on donor aid for many of the technological innovations that were taking place not only in the Ministry of Education but in other Ministries as well. The programmes became unsustainable (Amutabi, 2003).

In 1980, USAID in conjunction with KIE initiated the Radio Language Arts Project (RLAP), a 5-year school radio broadcast, research and development project whose primary aim was to enhance educational management, student retention and promotion, and improved academic performance in Kenya (Christensen, 1984). This programme aimed at intensively teaching English as a foreign language to pupils in the lower primary classes. The project was one of a number of educational assistance programmes launched by the USAID across a number of developing countries to help alleviate the challenges in educational infrastructure, schools, teacher training, materials and administration, compounded by rapid population growth. The project partially owed its success to the relatively low broadcasting costs at the time (Christensen, 1984).

The use of the radio at this point was also a means for the aid agency, USAID, to evaluate and document the effectiveness of formal intensive radio in English language teaching to young children. There was little documentation of appropriate methodologies in using the radio for successful language teaching in

[4] Telephone discussion with K24, a retired Assistant Director at KIE, on Thursday 9th December 2010.

Kenya. Also, this new form of technological innovation fitted very well with the existing educational curriculum in Kenyan classrooms, with the daily 30-minute radio lesson fitting easily with the regular school time-table. The RLAP had minimal per-pupil cost and modest investment in recording equipment and training of programme developers.

The radio played a core instructive role with the teacher playing a supportive and facilitating role to the pupils in this programme, unlike in the in-service programme for teachers where the radio provided supplementary materials for the teacher trainee (Christensen, 1984). The Ministry of Education revived the 3-year in-service courses for untrained primary school teachers in 1982, five years after the suspension as a number of the challenges that had dogged the programme had been addressed (K24).

With the enactment of the Kenya Broadcasting Corporation Act Cap 221 of 1988, the VOK was granted corporate status, after which it was re-branded as Kenya Broadcasting Corporation (KBC) in 1989. The KBC would assume the following functions:

> ...producing and broadcasting programmes or parts of programmes by sound or television; to provide for the management, powers, functions and duties of the Corporation; to provide for the control of broadcast receiving sets, and for the licensing of dealers, repairers and importers of broadcast receiving sets; and for connected purposes (Republic of Kenya, 1988).

The corporation refocused its programming to be current, commercially viable and profitable and would provide independent and impartial broadcasting services of information, education and entertainment. The KBC was repositioning itself for the 1990s, which marked an era of increased liberalization, with a broader operator base for commercialization of radio broadcasts. This translated to higher costs which would mark a turning point for the school radio broadcasts.

Meanwhile, global developments in information sciences were beginning to impact on the Kenyan situation. In Europe for instance, the 1980s saw the emergence of numerous Special Interest Groups to respond to the changes in information management. By the end of the decade, Special Interest Groups were formed involving non-print media, social sciences, energy and the environment, and community information systems. The focus on information systems indicated that there was increasing awareness of the potential of automatic devices for literature searching and information storage and retrieval, and this placed librarians in the forefront in the search for systems and policies to help manage the sector (Schellhammer, 2007).

In what may be interpreted as part of this stream of activity in the global trends in library and information sciences, one of the earliest efforts at writing a national ICT policy in Kenya began at a workshop of information professionals and librarians that was held in the 1980s. The workshop, whose objective was to produce a Draft National Information Policy, was jointly funded by the Kenya National Library Association (KNLA) and National Council for Science and Technology (NCST). Even though documentation on the outcome of this workshop is unavailable (Ochuodho and Matunga, 2005), it can be assumed that the librarians were those that operated libraries in schools and training institutions, since libraries largely existed in learning institutions at the time. This was an early pointer towards the link between education and information dissemination, and it established space for the education sector as a key player in subsequent efforts at national ICT policy making.

Another initiative that may be directly related to the global trends in information sciences was the establishment of the Learning Resource Centres (LRCs) in all

primary Teacher Training Colleges (TTCs) in the late 1980's. The LRC concept had been conceived in the mid 1970s out of findings from a series of research projects and workshops organized by UNESCO and funded by the World Bank. Despite being conceptualized around foreign models, the function of the LRC was expected to serve the purposes of the local Kenyan context:

> The idea of a resource centre [in an institution] is universal in its philosophy, structure and functions…In Kenya, the general layout of a resource centre is similar to those in Britain and the United States. In setting up a resource centre, however, one needs to adapt these foreign models to fit local objectives of education, economic strength and the total environment in which it is going to serve (Shiundu and Omulando, 1992).

Among other things, the LRC was designed to help promote a resource-based approach to teacher education in Kenya. The student teachers were exposed to an instructional strategy where they would construct meaning through interaction with a wide range of print, non-print and human resources. The resource centres also provided the students with opportunities to practice the information literacy and critical-thinking skills necessary to deal with the explosion of information that was now available through a variety of media (Shiundu and Omulando, 1992). Figure 5 below summarises the role of the LRCs as documented in Weunda (2005).

ROLE OF LEARNING RESOURCE CENTRES

- Serve as the centre of library services in the college
- Provide workshop facilities for making learning and teaching resources
- Provide storage facilities for teaching and learning equipment e.g. projectors and for spares for maintaining the LRC equipment
- To house micro-teaching facilities such as Closed Circuit Televisions (CCTVs) and video cassette recorders
- A venue for both viewing and providing a critique of recorded micro-teaching lessons

Figure 5: The role of Learning Resource Centres in TTCs

Establishment of the LRCs under the same administrative unit as the library in the colleges, with a specially trained lecturer to take up the administrative role as Head of LRC, is one more indication that the technologies in education in the 1980s were considered a crucial source of information and that persons involved in library and information management were considered best placed to participate in the implementation of policies around these technologies.

By the end of this phase, it can be argued that there was a closer and more explicit relationship and cross-sector collaboration between the education, and information and broadcasting sectors, than there were with the telecommunications sector. The link between the posts and telecommunications sector and the education sector was remote in the sense that it licensed the broadcasting of radio lessons to in-service teachers and learners by the KBC. The telecommunications sector also provided paid postal services for correspondence between trainee teachers and the remote tutors. In this phase, radio is the predominant technology in providing supplementary resources both for pupils and in-service teachers.

In terms of the ICT policy implementation model during this period, it is apparent that Type 1 implementation was more predominant in this phase (Tubin, 2006). Schools and teacher education programmes adopted the innovations that came with the radio, but it was not in ways that changed the routine of schooling. Teachers and students had to convene at a central place to 'listen' to the radio in a traditional classroom setting. Secondly, teachers involved in the teacher education programmes delivered through the radio continued to work in relative isolation from one another for much of the school term, as they received reading material through correspondence and worked independently on these in the course of their

duty within the school. In this phase, the use of ICT in education in general and teacher education in particular, was evidently to attain the same traditional goals, under the same conditions, while leaving values unchanged and realising no significant educational improvement (Tubin, 2006; Fullan, 2004). There were fragmented initiatives that were not implemented in an integrated strategy that would have outlined the educational improvement desired, interpreted against Fullan's 3 pillars of educational improvement: change, technology and pedagogy (Fullan, 2004).

5.2 1990 – 1999: Communications and liberalization

Following the 1990 World Conference on Education For All (EFA) in Jomtien, the Kenyan government embarked on efforts to accelerate implementation of the Jomtien EFA commitments, and drawing up work plans for the implementation and monitoring of progress towards the achievement of these goals. The 1990s were a period marked with economic hardships in Kenya owing to the implementation of the Structural Adjustment Programmes (SAPs) imposed by the World Bank to ensure debt repayment and economic restructuring in developing countries. In Kenya, this period was also characterised by poor economic growth, repaying of heavy international debt, inefficiency and corruption within government ranks (Ross, 1992). These made difficult the realisation of national educational goals and commitment to international declarations to which Kenya was a signatory, like the Jomtien Declaration.

One of the earliest initiatives related to ICT in education in this phase was the publication, by KIE, of the first curriculum that would lead to a Diploma in Computer Studies in 1991(Kenya Institute of Education, 1995). These Diplomas were offered by polytechnics and other technical training institutions (See: Figure 3), and prepared graduates for the general ICT industry owing to an increase in availability of computers in various sectors, and the subsequent demand for IT personnel. I was a student at a public university during this period and I witnessed non-computer science students paying for Certificate and Diploma courses in Computer Studies as an extra course offered by the Computer Science Department. Many graduates later taught the subject Computer Studies (as untrained teachers) when it was introduced in secondary schools. Others joined

the Kenya Technical Teachers College (KTTC) on an in-service basis to obtain teacher qualification certificates (K25)[5].

The first Draft National Informatics Policy in Kenya was published by the NCST in 1993 in response to the increasing availability of computers in various sectors. It was also a response to UNESCO's bid to popularise Information Technology in member countries at the time. Through the Intergovernmental Informatics Programme (IIP), UNESCO had carried out studies on the implementation of integrated policies and strategies for sectoral computerization (Ochuodho and Matunga, 2005). This was an early manifestation of the role that donor organisations would play in the efforts to formulate national ICT policies, not only in Kenya but also other countries in Africa.

International influences at the time were also manifest in the 1994 formation of the Common Market for Eastern and Southern Africa (COMESA), which replaced the Preferential Trade Area (PTA). The aim of COMESA was to form an economic and trading unit that would help overcome the developmental barriers faced by individual countries. COMESA identified the need to harness information technology for development, and was supported by United Nations Economic Commission (UNECA) in 1995 (Wilde, 2003).

In school education, the Kenya Broadcasting Corporation discontinued the schools radio broadcast programme for pupils in 1995, which it had run since its inception in 1964; the annual broadcast fee had shot from 7.5 million to 33 million Kenya Shillings (Kenya Institute of Education, 2005). This exceeded KIE's budgetary allocation and the bills accumulated into unpaid arrears. The Ministry of Education could not afford to meet the new costs of broadcasting.

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[5] Discussion with K25, a retired Section Head at the KIE on Thursday the 9th of December, 2010

By 1996, several partnerships had emerged in Africa to form the African Information Society Initiative (AISI), whose mandate was to spearhead the elaboration and implementation of national ICT plans, promotion of connectivity and ICT development in African countries. The partners in the AISI initiative included UNESCO, United Nations Economic Commission for Africa (UNECA or ECA), International Telecommunications Union (ITU) and International Development Research Centre (IDRC). These regional initiatives, which had their core focus on economic growth, determined the in-country agenda for ICT policy making in Kenya in the mid 1990s (ECA, 2008).

Around this time, the Government of Kenya introduced Computer Studies as an elective subject in the secondary school curriculum with the aim of fostering basic computer literacy in the pupils:

> The aim of the Computer Studies course is to equip the learner with basic skills that will enable him or her to use a computer for accomplishing day-to-day tasks at school, home and in the world of work. It is the intention of this syllabus to give the learner the required knowledge, skills and attitudes to enable him/her to fit and adapt to the ever changing computer world and appreciate the computer as a tool for tackling day-to-day problems (Kenya Institute of Education, 1996: p29).

It should however be noted that there were no trained teachers of the subject at the time and the introduction of this subject in the secondary curriculum exerted more pressure on DTTCs and universities to begin training teachers of the subject (K24). Other school-based teacher training programmes for teachers of Computer Studies also began around this time.

In 1998, the Kenya Communications Act was published. This was an Act of parliament that provided for the establishment of the Communications Commission of Kenya (CCK). The Act also provided for the transfer of functions, powers, assets and liabilities of the KPTC to the CCK, the Telkom Kenya Ltd and the

Postal Corporation of Kenya (Republic of Kenya, 1998). Until this time, the KPTC, which had been established by an Act of Parliament in 1977 (repealed in 1997), had monopolised the provision of telecommunications services. The establishment of the CCK put in place an independent regulator for the telecommunications sector and with the publication of this Act, liberalisation of the telecommunications sector began.

This was in step with the liberalisation and privatization of state-owned telecommunications operators elsewhere in the international scene (WTO, 1998). Britain for instance, which had enjoyed a historical relationship with Kenya since the pre-colonial era, had started its own in-country liberalisation process in 1990, and this may have influenced thinking in Kenya. Liberalization opened the market for competition and also opened the local markets for foreign investment. The World Trade Organisation (WTO) member countries opened their basic telecoms markets to competition in 1998, the same year the Kenya Communications Act was enacted.

Through the Agreement on Basic Telecommunications (ABT), the WTO provided a framework for the gradual liberalisation of market access and also established a framework of basic regulatory principles in member countries (WTO, 1998). These included measures that would prevent anti-competitive behaviour and promote non-discriminatory and timely provision of interconnection at cost-oriented rates. This would lead to reforms in the telecommunications market in Kenya that would then influence policy in the education sector.

Working under the Ministry of Information, the CCK made various moves towards improving ICT access in the education sector. One notable educational initiative where the CCK played a significant role was in providing support to the Kenya

Education Network Trust (KENET), a project that would construct and operate a private telecommunication network that aimed at interconnecting all universities and tertiary educational institutions. KENET had been funded by the Leland Initiative, through USAID. The Leland Initiative was a 5-year global information infrastructure project begun in 1996 whose main objective was to extend full Internet connectivity to African countries in order to promote sustainable development (KENET, 2007).

The CCK also provided financial support to KENET, allocated on ex-gratia basis the frequencies that were required and provided a waiver on frequency fees for the time that KENET was testing a VSAT system (Ogongo and Omungu, 2003). This was an indication of an enabling policy environment created by the government to allow the CCK to provide financial, technical and logistical support to an initiative of high educational potential. It can be argued therefore, that the creating of the CCK through the Kenya Communications Act of 1998 not only set the stage for the liberalisation of the postal and telecommunications sector, but also created a legally constituted body through which cross-sector collaborations between the telecommunications and education sectors became feasible before there was an integrated National ICT policy. Figure 6 below shows the KENET national coverage as at the year 2007.

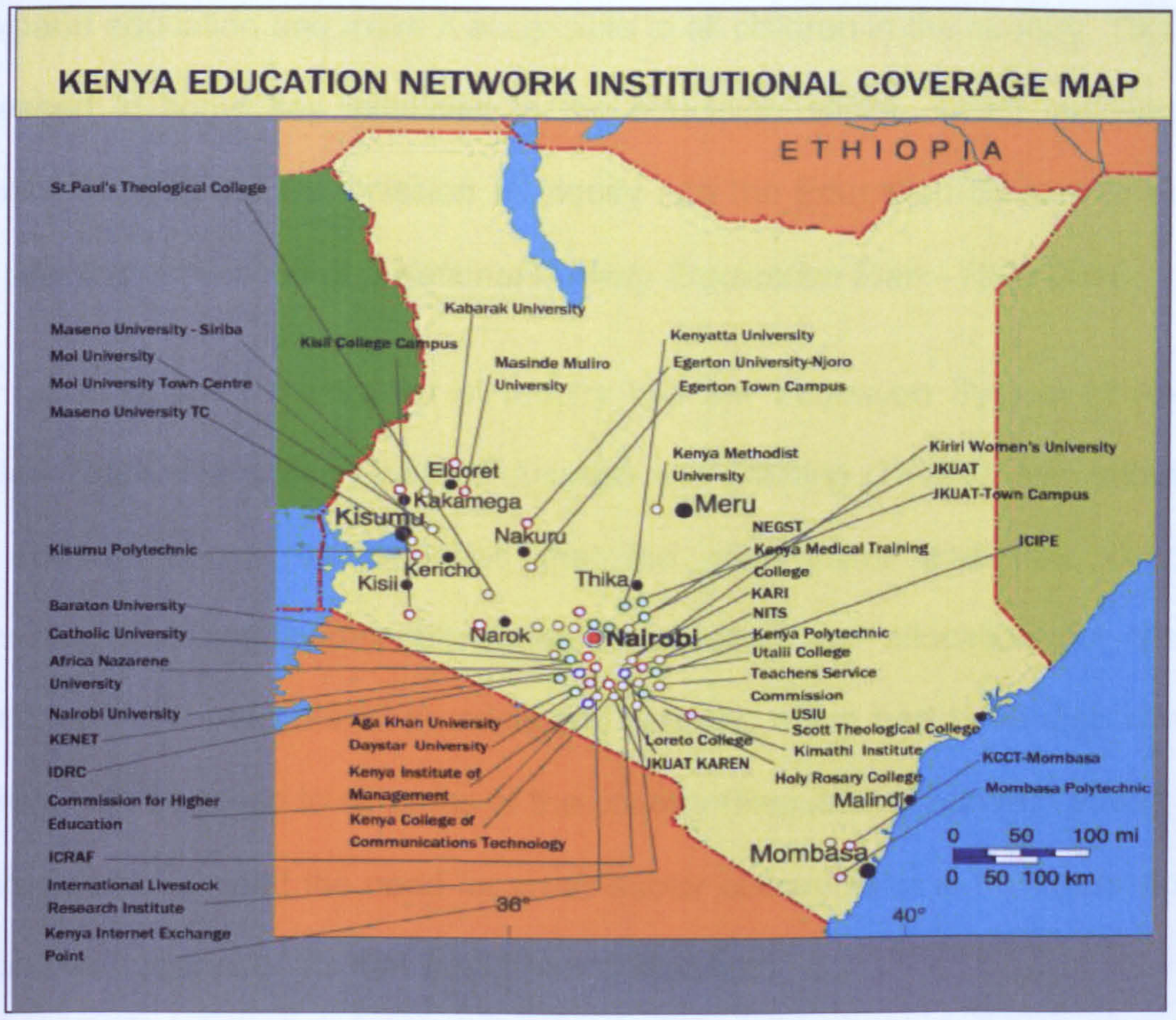

Figure 6: Kenya Education Network (KENET) institutional coverage map (Source: KENET, 2007)

It can be concluded that the failure to enact a national ICT policy in Kenya during the 1990-1999 period has been attributed to the fact that different technologies or aspects of ICT resided in different government ministries and departments, hence the lack of a 'key owner' for the policy. The Ministry of Finance was responsible for all ICT procurement and implementation but issues concerning the mass media were dealt with by the Ministry of Information and Broadcasting. No understanding could be reached on who should spearhead the ICT policy process in the cabinet. The institutional structures within government did not therefore support the development of a national ICT policy at the time (Ochuodho and Matunga, 2005; Waema, 2005).

Towards the close of the millennium, the education and the ICT sectors were separately going through radical changes. The government put in place strategies

to expand education and make it accessible to all children in the country. This was witnessed in some key initiatives in the education sector, which included the establishment of the Commission of Inquiry into the Education System in Kenya and also the publication of a *National Poverty Eradication Plan - 1999-2015.*

The report of the Commission of Inquiry into the Education System of Kenya, entitled *Totally Integrated Quality Education and Training (TIQET)*, also known as the *Koech Report,* recommended that the government undertake concrete measures, including sustainable funds mobilization and allocation, for the re-launching of the educational broadcasting services which had been discontinued in 1995, with outreach to all areas of the country (Republic of Kenya, 1999a). The report also recognised the need for cross-sector collaboration in the realisation of specific educational goals that would benefit teachers:

> ... that the Ministry of Education develops working relationships with the Ministry of Information and Broadcasting and other media houses for deliberate and affordable allocation of air time specifically for the promotion of Alternative and Continuing Education programmes [Emphasis own] (Republic of Kenya, 1999a: p204).

The TIQET did not mention the use of ICTs in teacher education but it made the following proposals that had a bearing on teacher education programmes:

> Flexible learning programmes [should] be created in learning institutions to cater for lifelong education programmes of all ages...Distance learning [should] be used as a vehicle for promoting the culture of lifelong learning nationwide by establishing continuing education programmes in those areas of Kenya where such programmes have not been initiated (Republic of Kenya, 1999a: p38-39).

The *National Poverty Eradication Plan 1999-2015* was developed in line with the Copenhagen Summit of 1995 that was attended by more than 100 world leaders. The outcome of the summit, was the Declaration of the World Summit for Social Development (WSSD), to which Kenya was a signatory. The goals adopted focused on eradication of poverty and achievement of Universal Primary

Education (UPE), among others. The plan outlined the country's commitment to poverty reduction through social and economic reforms that would see increased investment in health and education sectors. This was necessitated particularly after the setbacks experienced with the implementation of the International Monetary Fund (IMF) and World SAPs in the previous years (Republic of Kenya, 1999b).

Like TIQET, the *National Poverty Eradication Plan (1999-2015)* did not make explicit mention of ICTs in education and training, but it did set the stage for the varied interventions in the education sector at the turn of the millennium, which included reforms in the primary school curriculum and more engagement with the teachers:

> ...Policy and management initiatives will include: a primary school curriculum focused on key universal skills; more effective and decentralised primary school management , and a teaching profession committed to leadership in the search for broad based development (Republic of Kenya,1999b:pxiii).

At the close of the millennium, there is evidence that there were a number of regional and continental efforts aimed at harmonising ICT policies in Africa and a more integrated approach to policy making had been taken, with ICT being seen not only as a sector that on its own needed regulation, but also as an enabler that would drive socio-economic development in sectors like education, health and agriculture. The introduction of Computer Studies as a teaching subject in the secondary school curriculum in the mid 1990s required that teacher education institutions and universities begin to prepare trained teachers of Computer Studies. This gives evidence of the persistence of Type 1 implementation models where Computer studies are taught in the same way as the traditional disciplines in the curriculum (Tubin, 2006; Cuban 1993). Finally, the establishment in 1998 of

an independent regulator, the CCK, seemed to put in place a body to coordinate cross-sector ICT initiatives between the education sector and the telecommunications sectors, especially with the increasing availability of ICTs, notably computers and the internet. KENET was the first initiative to interconnect tertiary and higher education institutions.

5.3 Post 1999: ICTs for economic growth

By the turn of the millennium, the World Bank and the IMF were implementing the Poverty Reduction and Growth Facility (PRGF), whose main requirement was that developing countries prepare country driven Poverty Reduction Strategy Papers (PRSP) to serve as a guide for development assistance in support of sustainable poverty reduction. The PRSPs were policy documents that outlined the national programme for poverty reduction and formed the foundation for lending programmes with the IMF and the World Bank, and debt relief for Heavily Indebted Poor Countries (HIPCs) (Nyong'o, 2005).

The PRSPs would subsequently guide the development of other in-country polices that addressed the poverty reduction objectives. Also directing Kenyan policies around this time were the UN Millennium Declaration and the Dakar Framework for Action on Education for All, both from 2000.The year 2000 marked the date by which time the Jomtien commitment to provision of Education for All (Jomtien, 1990) would have been realized. These initiatives can be said to have highly influenced ICT policy making in Kenya and the formulation of education policies in the post-1999 era that focused on the ICTs, particularly computers and the Internet.

The ICT in education policy documents in Kenya in the post-1999 era therefore draw from a process that began in the year 2000 with the enactment of Education for All and were given further impetus by the National Rainbow Coalition (NARC) government that came to power in 2002. The previous ruling party, Kenya African National Union (KANU) that had been in power for 39 years, lost the elections to NARC. NARC assumed power with a pledge to facilitate wealth creation and

poverty reduction by fast-tracking economic growth in Kenya (NARC Manifesto, 2002). These conformed with the World Bank conditions on wealth creation and poverty reduction.

Some of the ICT initiatives that actively rolled out in the education sector around this time were focused on to providing ICT infrastructure to schools, particularly computers and printers. The Computer for Schools Kenya (CFSK), which was established in the year 2001 and worked through a partnership model with educational institutions, drew its implementation approach from the Computers for Schools Canada (Obura, Musili and Etta, 2005) - a significant example of a locally initiated project that had been influenced by international programmes. The CFSK teacher education programmes at the time aimed at building the capacity of specific teachers in their partner secondary schools to teach an internally certified ICT proficiency course developed by CFSK, and also to deliver the newly introduced subject in the national curriculum, Computer Studies.

Also of significance was the launching of the continental New Partnership for Africa's Development (NEPAD) project in 2001 as an integrated strategic framework for socio-economic development, with a strong poverty reduction agenda targeting an initial 20 countries in Africa. The in-country NEPAD e-schools project in Kenya was officially launched four years later. The prioritization of computer infrastructure and internet connectivity provision for schools was also a feature of NEPAD. The NEPAD e-schools teacher education programmes targeted selected teachers in their partner secondary schools (Farrell, 2007).

The School Based Teacher Development Programme (SbTD) aimed at building the capacity of teachers in primary schools. Launched in 2001, it was an initiative funded by the UK Department for International Development (DFID) that aimed at

improving teachers' skills through the use of technologies. The SbTD was a modular course aimed at developing the capacity of 50,000 Key Resource Teachers (KRTs), who were subject specialists in Maths, English and Science in all the 18,000 primary schools in the country at the time.

The first phase of the SbTD ended in 2004 and a one-year extension of the programme was launched in 2005 to train an additional 36,000 teachers of the subjects Kiswahili and Guidance and Counselling. Despite the relatively fast diffusion of the internet in various settings in Kenya at the time (Oyelaran-Oyeyinka and Adeya, 2004), the same could not be said of Internet connectivity in schools, primary teacher training institutions and universities. The use of print, audio cassettes and VHF videos seemed the only practical way to reach the large number of teachers involved. The computer based and online component of the programme were therefore not implemented as intended (MoEST, 2004). A number of primary teacher training colleges had, however, launched ICT skills training programmes around this time, perhaps as a response to social pressure and market demands for an ICT literate workforce.

In what may have been an influence of the 1999 TIQET proposal, the World Bank funded a project that re-introduced radio broadcasts for schools in the year 2002 at an approximate cost of Kenya Shillings 500 million. The *ICT in Education Options Paper* reports that this project was a Public Private Partnership between the Ministry of Education and WorldSpace Radio, a company that used satellite technology to deliver learning content to schools (Republic of Kenya, 2005b). WorldSpace Radio provided special WorldSpace receivers for the satellite signals, which the Ministry distributed to over 11,000 primary schools and all the 21

primary TTCs. The Ministry also paid an annual fee of Kenya Shillings 9,000 in respect of each institution.

When the Free Primary Education was introduced the following year, in 2003, the government took responsibility of pre-paying for the WorldSpace subscriptions while the KIE prepared the broadcast programmes for the pupils. Even though the WorldSpace Radio had been distributed to the primary teacher training colleges to expose the pre-service teachers during their training on its use. I could not find any documentation of its impact on the teacher education programmes at the primary teacher training colleges.

The Economic Recovery Strategy Paper for Wealth and Employment Creation 2003-2007 (ERSPWEC), popularly known by its shorter acronym ERS, was published in June 2003. The ERS drew from the NARC Manifesto, NARC's Post Election Action Programme (PEAP), the PRSP developed in 2000 in response the World Bank's PRGF, a number of National Development Plans, sectoral policy documents and sessional papers that had variously directed the economic policy planning in Kenya since independence (Nyong'o, 2005). The strategy outlined key targets for reform in various sectors and recognized the empowering role that ICT would play in the post-1999 era:

> The government recognizes the economic value and benefits of ICT service both in the rural and urban areas. ICT is important to the realization of the required improvement in productivity and empowerment of the citizenry...the government intends to invest in adequate ICT education and training. In this context, the government will streamline the education curriculum to incorporate IT studies to develop appropriate skill requirements.'(Republic of Kenya, 2003: p55).

This policy statement was the first to explicitly recognize the role of ICT as an empowerment tool for its workforce. The streamlining of IT Studies in the curriculum seemed to resonate with earlier initiatives that had introduced

Computer Studies as a separate set of skills to be learnt by students who elected to study the subject or teachers who wanted to teach Computer Studies as one of their teaching subjects. This policy however expanded the focus to all teachers and students.

The ERS recognized that there had been low penetration of ICT usage in Kenya at the time, especially in the rural and marginalised areas due to high cost of equipment, poor telephone communications service and lack of electricity supply. Other impediments included 'lack of awareness, priority, focus, co-ordination, resources and capacity' (Republic of Kenya, 2003: p55).

In response to this, the ERS recommended the implementation of a well targeted tax reduction and tax incentives on both computer software and hardware to make them affordable to micro-enterprises and low income earners (p56). Subsequently, the government zero-rated the import duty charged on computers and related peripherals in 2003.

In the same year, 2003, the privatization of Telkom Kenya began in earnest as a pre-condition for a USD 205 million loan to Kenya by the IMF. In a bid to open up the telecommunications market to competition and achieve universal access, the government licensed other private sector telecommunications companies to operate in various parts of the country (Kirui and Muhatia, 2005). From the documentation I could access, it is unclear if these initiatives translated to any direct benefits for schools and teacher education institutions.

Around this time, the government of Kenya also felt the need to expose teachers to contemporary and relevant experiences using modern methods and media in line with the proposition in the ERS for the streamlining of ICT in education and

training. Between September and November 2004, an ICT scoping study was undertaken by the Ministry of Education in order to establish the professional, institutional, logistical, and cultural and equity issues of access to ICTs (MoEST, 2004). The MoEST received support from DFID, through its Imfundo programme to conduct this study. The outcomes of the study informed the implementation of the School Empowerment Programme (SEP) , a school-based multi-media training course for Head teachers, deputy head teachers, senior teachers and graduate Key Resource Teachers (KRTs) in primary schools in Kenya. The scoping study was also instrumental in determining the possibility of future support for on-line professional development for teachers and teacher educators. I was among the three consultants who undertook this study.

A key outcome of the scoping study was that an ICT based approach would be successful, but would need very careful organization at district level to take into account the challenges posed by constraints in equipment and infrastructure witnessed in various parts of the country (MoEST, 2004). The report recommended that a plan be drawn that would 'develop ICT based pedagogical materials in order that the benefits of IT be felt in each subject area of the curriculum' (pg 58). This was the first indication of the appreciation of ICT as a pedagogic tool. This study report informed the content of subsequent policy documents, especially the *ICT in Education Options Paper* published in 2005.

The School Empowerment Programme (SEP) was subsequently launched in 2005 and it built upon the structures and approaches that had earlier been instituted in the SbTD programme. Through the SEP, the Ministry of Education developed an ICT-enhanced professional development programme for teachers in primary schools in Kenya. The SEP used ICTs to improve the capacity of the teachers who

had successfully completed the SbTD programme. It employed a blended learning approach particularly developed to help alleviate the management, leadership and pedagogic challenges that had come about with the introduction of the Free Primary Education (FPE) policy. The SEP deployed learning materials through print, audio, radio and video, which were accessed in school-based workshops and centralized meetings. Just like the SbTD, the SEP did not provide training through the more advanced ICTs like the internet and CD-ROMs owing to capacity challenges within KIE and the Ministry of Education to develop such a programme (K1). The SEP programme ran until June 2006.

In the primary teacher training institutions, ICT skills training was formally introduced in the Primary Teacher Education (PTE) curriculum in 2004, when an official national ICT syllabus for all the 21 public primary teacher training colleges was published by the KIE. The content of the ICT PTE Syllabus is contained in Appendix 5.

As the colleges were making efforts to deploy this curriculum, there was an emerging awareness among the curriculum development specialists at the KIE on the need to teach ICT not just as a separate skills set to the teachers but to use it as a pedagogic tool in all subject areas, what is prevalently referred to in the policy documents as 'ICT integration'. Operationalising this in the teacher education curriculum had however seemed to present problems. The introductory section of the ICT Primary Teacher Education Syllabus had a statement that pointed towards preparing teachers who could use ICT to support pedagogy:

> This syllabus therefore seeks to answer the question 'what technology, *skills* and *concepts* is a teacher expected to demonstrate to be able to use computers and their related technologies to *support the instructional process* in their various subject areas'... ICT will be offered as a service subject at Primary Teacher level of Education. It is intended to equip the

> learner with general understanding of ICT skills, tools and devices that may be used to enhance teaching and learning of various subjects in their curriculum (*Emphasis own*) (Kenya Institute of Education, 2004: p209).

This statement seemed to suggest that ICT would be a cross-curricular subject in the teacher preparation context and at the same time, equip pre-service teachers with basic ICT skills that they needed to teach their subjects effectively. The syllabus content, however, suggested otherwise, focusing almost entirely on ICT skills. The syllabus was not designed to develop a pre-service teacher who would be able to use ICT support pedagogy at the primary schools but was instead focused on ICT designed to be taught as a separate compulsory subject in the primary teacher education curriculum. The content of the syllabus purely focused on basic ICT skills and made no reference to the 'instructional processes' that ICT could facilitate in other subject areas.

The publication of the *E-Government Strategy: The Strategic Framework, Administrative Structure, Training Requirements and Standardization Framework* in March 2004 seemed to add impetus to the inclusion of ICT skills training for all government personnel:

> As part of the training strategy, and in order to ensure a continued pool of IT knowledge base within government, all training programmes undertaken by government personnel will have an IT component' (Republic of Kenya, 2004: p21).

The e-Government Strategy therefore set the stage for the *Sessional Paper No 1 of 2005: A Policy Framework for Education, Training and Research*. This paper, on which a number of policy documents would later be anchored, recognized both the significance of ICT skills for the citizens of Kenya and value of ICT as a tool for pedagogy in education and training:

> The government appreciates and recognizes that an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy (Republic of Kenya, 2005a: p79).

In order to provide the requisite ICT skills, the government would provide computers to primary, secondary schools and teacher training colleges. Other statements in the same document demonstrated the government's appreciation of the role of ICT in education and training, and expressed the government's intention to encourage use of ICT for pedagogy:

> Information and Communication Technology have a direct role to play in education...if appropriately used, ICT can bring many benefits to the classroom and the education and training process in general...ICT will provide new opportunities for teaching and learning including offering opportunity for more student centered teaching, opportunity to reach more learners, greater opportunity for teacher-to-teacher, and student-to-student communication and collaboration, greater opportunities for multiple technologies delivered by teachers, creating greater enthusiasm for learning amongst students and offering access to a wider range of courses (Republic of Kenya, 2005a: p80).

In this document, the government expressed the intention to promote expanded use of ICT as a tool for effective management, research and development at all educational levels and use the internet for education, training and research. It aimed to provide teachers and education sector managers with access to information and tools 'to enable them to better deliver educational services' (p83). This policy document also had a statement that implied that the promotion of ICT for pedagogy would improve the ICT skills required by the learners and the teachers:

> The Ministry's policy on ICT is to integrate ICT education and training into education and training systems in order to prepare the learners, and staff of today for the Kenyan economy of tomorrow and therefore enhance the nation's ICT skills (Republic of Kenya, 2005a: p80).

During the same year 2005, KIE published the *ICT Teaching Guide for Primary Teacher Education.* The KIE invited a number of stakeholders and subject panel members to a writing workshop where it emerged that it was important to re-focus the attention of the trainers to pedagogy and ICT subject integration and not the ICT skills as stipulated in the syllabus. I was a resource person in this and a

number of subsequent stakeholder and ICT subject panel meetings. In a process spearheaded by the Flemish Development Agency (VVOB) and Microsoft, the ICT Teaching Guide for Primary Teacher Education was prepared to increase awareness on the need to integrate appropriate technologies into the teacher training process in a way that was underpinned by sound pedagogy (Kenya Institute of Education, 2005).

The teaching guide also empowered the Head of ICT Department to take charge of the interpretation of the syllabus to promote meaningful learning at the college and also to ensure that the focus remained on pedagogy and ICT integrated learning and not on technology. The publication of this teaching guide was intended to mark a turning point in primary teacher education in terms of the ICT-pedagogy integration, role of the ICT department and also the role of ICT as a cross-curricular subject. In this teaching guide, a topic on ICT Integration in Education, which had been missing in the syllabus, was included. The guide stated the expectation on lecturers of all subjects in the PTE curriculum:

> Even though the syllabus does not make provision for mainstreaming ICT in all subjects, it is important that your students understand that ICT should be integrated into the entire curriculum. Throughout their teacher education experience and professional development programs, pre-service trainees should learn how to incorporate ICT into their own subject. Restricting technology experiences to a single course or a separate area of teacher education, will not prepare trainees to be technology using teachers (Kenya Institute of Education, 2005: pxiii).

The guide therefore focused a little more on pedagogical use of ICT in teacher education.

Still in the year 2005, the USAID engaged a team of consultants whose mandate was to explore the various ways in which the Ministry of Education could integrate ICTs across the education sector. The ICTs under consideration ranged from Interactive Radio (IR) to Satellite Internet. The outcome of this initiative was the

publication of the *ICT in Education Options Paper* in the year 2005. The paper offered a broad assessment of the status of ICT in the education sector (MoEST 2005a) and proposed ways in which ICT can be leveraged to support and improve the delivery of quality education for all Kenyans. The paper proposed various options based on the educational priorities that included: Interactive Radio Instruction (IRI), quality teaching and learning through ICT, ICT skills development, ICTs and Education Management Systems and policy and ICTs in education, among other options.

The subsequent drafts of the *National ICT Strategy for Education and Training* would draw heavily from this paper, especially in identifying the 'strategic pillars' that would ensure the deployment of ICTs to improve access, quality and equity in the delivery of education in Kenya. The 'pillars' that would have direct influence on teacher training included:

> digital equipment, connectivity and network infrastructure, harnessing emerging technologies, digital content development, integration of ICTs in education, training and capacity building (including professional development) and research and development (Republic of Kenya, 2006a: pv).

These 'pillars' formed themes around which sections of the subsequent ICT policies in education revolved.

With the support of the World Bank, the education sector adapted a sector wide policy anchored on the *Kenya Education Sector Support Programme (KESSP)* published in July 2005. Its aim was to help achieve Education for All and the Millennium Development Goals (MDGs). The KESSP also drew from the policy framework captured in the *Sessional Paper No1 of 2005*, the *E-government Strategy* of 2004 and the *National ICT Policy* that, at the time, only existed in draft form and was not available for public access. The KESSP document recognized

the significant role that teachers would play in the implementation of an ICT-based curriculum and the need to train them on the pedagogic use of ICT:

> It is important that Kenya's teachers be exposed to contemporary and relevant experiences in using modern methods and media, including ICTs in curriculum delivery (Republic of Kenya, 2005c: p130).

KESSP also stipulated the intention of the government to train all teachers on ICT skills and to increase the number of teachers trained to teach ICT as a subject:

> The ICT investment programme will... support teacher training colleges and universities in development and production of ICT teachers... The performance indicators projected for these strategies are... ICT literate workforce...number of secondary and primary school teachers trained...Provision of trained teachers (of ICT) in collaboration with TSC and Teacher Training Colleges (Republic of Kenya, 2005c:173-179)

Since it was anchored in the Sessional Paper No 1 of 2005, the KESSP document also had statements that tended to juxtapose ICT skills training and ICT as a tool for pedagogy:

> ... The Ministry's policy on ICT is to integrate ICT education and training into education and training systems in order to prepare the learners and staff of today for the Kenyan economy of tomorrow through the enhancement of the ICT skills (Republic of Kenya, 2005c: p156)

The policies in KESSP around the use of ICT in teacher education came in three strands: training a teaching workforce with general ICT skills and knowledge, training teachers of ICT as a subject and training teachers on the use of ICT as a tool for effective pedagogy in the other teaching subjects.

Also, drawing closely on the *Sessional Paper No 1 of 2005* as well as the *Economic Recovery Strategy for Wealth and Employment Creation (ERS 2003-2007)*, was the Draft National ICT Strategy, which was published in March 2006 (Republic of Kenya, 2006a). The Ministry of Education attached a lot of significance to ICT integration in the entire education system and in pre-service teacher education in particular. The draft strategy acted as a blue print that guided

the education and training sector in the adoption of ICTs in E-government, Education Management Information Systems (EMIS) and eLearning. The strategic objectives to realise the training of teachers on the pedagogic use of ICT were explicitly stated:

> To establish model institutions that will be used to demonstrate integration of ICT to teaching and learning...to train at least 20 master integrators to support integration at the national and district levels...to train teachers on integration techniques and sensitize education managers on ICT integration (Republic of Kenya, 2006a: p10).

The outcomes expected from the implementation of these policies included an increased rate of educational institutions that had integrated ICT in the delivery of educational curricula.

To improve capacity building and professional development in ICT use in education, the *Draft ICT Strategy for Education and Training* stated that the teaching force of 197,000 primary and 38,000 secondary school teachers would be trained in ICT literacy and integration. This suggests that policy makers within the Ministry of Education appreciated that ICT skills and ICT integration in subject teaching both formed a necessary knowledge base for all teachers. The document expressed the intention of the Ministry of Education to build basic capacity in ICT skills for all players in the education sector, to build capacity of education sector managers to use ICT tools to enable better delivery of educational services and to sensitize all stakeholders on ICT integration.

The distinction between the training of teachers in ICT skills and training teachers on ICT for pedagogy was clear in this document. It expressed the intention to build ICT skills in teachers and to ensure the infusion of ICT in the curriculum:

> To build the capacity of universities and colleges to equip teachers with ICT skills up to certificate, diploma and degree level...To develop sufficient capacity for curriculum and content developers to appropriately infuse ICT

> in the curriculum and develop digital content to support the curriculum...To build the capacity of TIVET trainers and university lecturers, to promote the development, adoption and use of ICT tools of production in all sectors of the economy (Republic of Kenya, 2006a: p11).

One statement in this document stated the intention to train one teacher in each school for multiple roles:

> To build capacity for at least one teacher in each school to teach ICT, support ICT literacy and integration and basic maintenance of ICT equipment (Republic of Kenya, 2006a: p11).

The Draft National ICT Policy, which was published in March 2006, was anchored on the ERS 2003 – 2007. ICT was, in itself, seen as a way of enabling Kenya to attain swift and sustainable economic growth, reduce poverty and stimulate investment and innovation in ICT, among other things. This policy document was also based on the Common Market for Eastern and Southern Africa (COMESA) Model adapted by the COMESA Council of Ministers in 2003. The guiding principles outlined in the policy are: infrastructure development, human resource development, stakeholder participation and appropriate policy and regulatory framework (Republic of Kenya, 2006b).

The Draft National ICT Policy document recognized that the legislation that existed before (The Science and Technology Act, Cap 250 of 1977, The Kenya Broadcasting Corporation Act of 1988 and the Kenya Communications Act of 1998) did not adequately address the issues of convergence, electronic commerce and e-government, hence the need for a comprehensive ICT policy that would support 'ICT development, investment and application in line with the emerging technologies and the innovations that they support' (Republic of Kenya, 2006b). The policy document also committed to:

> ...strengthening and streamlining training, promoting ICT education at primary, secondary, tertiary and community levels by developing ICT

> curricula and ensuring that teachers and trainers have the requisite skills (Republic of Kenya, 2006b: p4)

This statement referred to ICT skills for all teachers and trainers. Also in line with this, the policy aimed at setting up a framework for evaluating and certifying ICT training programmes, attracting and retaining skilled human resources, establishing networks for sharing training resources and developing strategies to support research and innovation. The intention of the Ministry of Education 'to create awareness of the opportunities offered by ICT as an educational tool to the education sector' (p12) indicated an explicit intention to train teachers on how to exploit the affordances of ICT to improve learning outcomes.

Just like the KESSP, the *Draft National ICT Policy* addressed the need to establish e-learning infrastructure and promote the development of e-content in all learning institutions. This was aimed at improving the quality of teaching and learning, integrating ICT in subjects at all levels of education and promoting distance education and virtual institutions in higher education and training.

The National ICT policy, published in March 2006, stated that the lack of a policy framework on e-learning had hampered its development and utilization and emphasized the need to provide affordable infrastructure to facilitate dissemination of knowledge and skill through e-learning platforms. This policy document aimed at promoting the development of e-content to address the educational needs of primary, secondary and tertiary institutions.

The final *National ICT Strategy for Education and Training* which had hitherto been in circulation in draft form, was released in June 2006, having been revised to fit with the *National ICT Policy* that had been published earlier in the year. The provisions on ICT in teacher education in both documents remained the same as

those in the previous drafts. The *National ICT Policy* gave the following provisions of relevance to teacher education:

> The Government recognizes the role played by the various institutions providing ICT education and training. However, there is need to strengthen and streamline the training through promoting ICT in education at primary, secondary, tertiary and community levels by developing ICT curricula and ensuring that teachers/trainers possess the requisite skills...setting up a framework for evaluating and certifying ICT training programmes (Republic of Kenya, 2006b: p9).

This phase of ICT policy making seemed to have been grounded on the global focus on ICT policy development assisted by donor organisations. There was also the push from the World Bank and the IMF for countries to develop policies that focused on poverty reduction and economic growth. The policies originating from the Ministry of Education recognised the crucial role that ICT played in promoting innovation and sustainable growth. The following lines of development emerge:

- ICT as a discipline
- ICT as a skill for all teachers as part of the competencies required
- ICT as a pedagogic tool for supporting the teaching of all subjects

The move had generally been towards training more teachers of ICT as a subject, developing the ICT skills in practising and pre-service teachers and developing teachers with knowledge, skills, competencies and attitudes to actualise ICT-pedagogy integration. It will be significant to find out how the emerging ICT policy themes found in the policy documents published between 1997 – 2007 have been received and interpreted at institutional or organisational level in teacher education programmes, and what other factors influence practice in these programmes.

5.4 Conclusion

The following key points arise from this chapter:

- The documentary analysis reveals that the policy statements related to ICTs in teacher education since independence to the study period span several individual documents originating from different Ministries. The key themes in the ICT policy process of relevance to teacher education include:
    - ICT infrastructure in Teacher education
    - ICT integration in Teacher Education
    - Capacity building in ICTs
    - Digital Content and e-learning
    - ICTs for flexible / distance/ life-long learning/ ODE / virtual learning among teachers
    - ICTs for teacher-to-teacher communication and collaboration
    - ICTs for actualisation of the e-school concept
    - ICTs for Research and development in teacher education
- The government's intention to develop teachers of the subject ICT becomes clearer in the policies in the late 1990s and the post 2000 era. Attempts to delineate in the policy statements in the study period intentions to train teachers with ICT skills and also the capacity for ICT- pedagogy integration remain confusing and sometimes unclear. This might present interpretation and implementation hurdles within the various teacher education programmes.
- There is an apparent shift in focus in the ICT policy development and implementation processes: from policies that anticipate a predominantly Type I implementation focus in the pre-1999 phase, to those that anticipate Type II implementation of ICT (Tubin, 2006) in teacher education in

particular, and education in general. There appears to be more integrated statement of outcomes in the post 2000 era, suggesting an evolving approximation of Fullan's 3 pillars of educational improvement (Fullan, 2004). The desired change in pedagogy using ICTs is evident to varying degrees in policies and educational and teacher education initiatives as from around 2005. There is evidence of some awareness of the potential of Type II implementation to change traditional ways of teaching and achieve educational innovation

- The analysis reveals that certain organisations and institutions such as the CFSK and the NEPAD developed ICT initiatives long before national ICT policies expressed clearly the place of ICT in education. These initiatives would inform some subsequent policy making activities at the Ministry-level institutions.

CHAPTER SIX: PERSPECTIVES OF KEY STAKEHOLDERS

Introduction

This section of the study presents the data drawn from interviews with key persons working or closely associated with various teacher education institutions and related programmes in Kenya. The interviews were conducted to capture the perceptions of these key people on the possible influences and forms of ICT in teacher education programmes in Kenya in the period between 1997 and 2007. The interviews took place at the workplaces of the respective participants, which included the Ministry of Education offices at Jogoo House in Nairobi, the Kenya Institute of Education (KIE), various universities and teacher training colleges. These interviews began while I was in the process of conducting the documentary analysis.

The respondents were purposively sampled to represent a cross-section of persons who had participated in various teacher education or related programmes either at policy making, curriculum development or teacher training level. Informants drawn from the Ministry of Education included a Senior Education Officer in the Teacher Education division and the eLearning Officer. A number of respondents at the KIE were interviewed, since I considered KIE a core institution both in the formulation and implementation of the ICT policies in teacher education. The full list of respondents is presented in Appendix 13

Responses from the key informants suggested that the teacher education programmes had varying approaches to and areas of focus in defining the role of

ICT in teacher education, reflecting the analysis in Chapter 5 that suggests that there was variation in the articulation of the place of ICT in teacher education in the national policy documents and initiatives. In this chapter, I analyse the perspectives of key stakeholders on ICT policies and initiatives of relevance to teacher education under two broad sub-headings: perspectives on pre-service teacher education programmes; and, perspectives on in-service teacher education programmes.

6.1 Perspectives on pre-service teacher training programmes

Pre-service teacher education in Kenya takes place in Universities, Diploma Teacher Training Colleges (DTTCs) and Primary Teacher Training Colleges (PTTCs). Since I interviewed participants who were currently working, had worked or had some associations with particular training programmes in these institutions, I have analysed the data under the following sub-headings: Universities, Diploma Teacher Training Colleges and Primary Teacher Training Colleges.

Universities

Kenya currently has 7 public universities, several constituent colleges and a number of private universities that train teachers in various subject areas. Respondents in teaching or administrative roles at the public universities were interviewed and their perceptions noted on the extent to which specific aspects of ICT in teacher education programmes at the universities, like the curriculum, had been influenced by national ICT policies or other factors.

It emerged that universities trained teachers of ICT, who were then deployed to teach the subject Computer Studies in secondary schools. The first group of such teachers graduated in 2003, and were of two types: those who had registered for Bachelor of Education degree, with Computer Studies as one of the two teaching subjects, and graduates of Bachelor of Science degree who would later proceed for Post-Graduate Diploma in Education (PGDE) and elect Computer Studies as one of their teaching subjects:

> All trained teachers of Computer Studies are trained on the methodologies and content of the secondary school Computer Studies syllabus. They have good ICT skills that enable them to meet the expectations of the ... syllabus (K12).

Computer Studies was introduced in the secondary school syllabus in the year 1996, but K13 observed that teachers of the subject Computer Studies were still in short supply several years later, and it was unlikely that the full implementation of school-wide ICT programmes in secondary schools would be effective. He observed that in one University, there were only 5 students registered for Computer Studies as one of the teaching subjects, out of approximately 500 pre-service teachers. K14 suggested that it was not until the year 2005, that the Teachers Service Commission officially began to deploy trained Computer Studies teachers to secondary schools and colleges, thereby addressing the shortfall and clearing the backlog of trained teachers that had stayed unemployed for a number of years.

In some universities in Kenya, ICT had been in the early 1990s, introduced as a discrete skills subject that did not interface at all with other subjects in the curriculum. K11 observed that in one university where Computer Studies had been introduced as a compulsory subject for all undergraduate students, the pre-service teachers were exposed to compulsory Computer Science units which comprised

30% of the content of the entire Bachelor of Education course. He said that the already over-stretched computer laboratories were accessed by all students during regular teaching hours and student teachers were not exempt, thereby making it difficult for the student teachers to begin to see ICT as more than a discrete subject on the curriculum:

> What's the point of making Computer Science constitute 30% of the student teacher's course, yet the content of the course includes units in Software Engineering and Neutral Networks? (K11).

It was evident that the Computer Science units offered by this university did not directly prepare the student teachers to use ICT in the other subjects of the school curriculum. There was therefore a tension here between the government intention to use ICT to improve learning outcomes in schools and the way it was being enacted in the university programmes. The student teachers were offered ICT courses that were not in any way linked to their teaching subjects.

Referred to as 'Degree with IT' programme, this programme was launched in this particular university in the year 2004, a period when institutions of higher learning were making efforts to keep in step with the evolving ICT policy that emphasised the role of institutions of higher learning in building ICT skills and capacities to mainstream the education curriculum to incorporate IT studies in order to develop appropriate skill requirements (Republic of Kenya, 2003: p55).

K13 observed that the universities in Kenya were yet to use ICT as a pedagogical tool in their curriculum:

> The universities in Kenya have not started using ICT for pedagogic practice in their curriculum, neither are students and lecturers expected to use internet in learning or teaching the university courses... Very few institutions have installed learning management software and even where it exists, it is difficult to tell the extent of use of the e-learning platform (K13).

This respondent indicated that the teacher education curriculum at a number of universities known to him did not focus on the pedagogies that can be made possible by the computer and other modern technologies but instead they still focused on use of audio visual technologies like the audio and video cassette technologies in the classroom. In his opinion, these universities neither taught the pre-service teachers how to integrate ICT in their teaching subjects nor actually integrated ICT in the various teaching subjects that the teachers were exposed to. He knew only of one university that had revised its Education Technology syllabus to expose the trainee teachers to teaching approaches and pedagogies using modern technologies.

The question of ICT-subject integration was also linked to physical access by the student teachers:

> [In one university] the computer laboratories are all located at the Computer Science Department. They [laboratories] are locked at 5pm and opened at 8am. This means that they are only meant for use for regular teaching of the courses offered by the Computer Science Department. Lecturers from the Education Department, or any other department, cannot access the laboratories to teach education related courses (K11).

It was K11's observation that implementation of ICT policies at the university revolved around a separate Computer Science Department that was responsible for imparting ICT skills to the rest of the university and giving general procurement direction and support. He was unclear on whether this was an ideal model in the implementation of ICT policy in the curriculum at the University.

There were scattered efforts to streamline ICTs in the public universities for teaching, learning, research and management according to K15, with each university charting its own path. There were also efforts to use electronic learning

(e-learning) to widen access to higher education in the country but in his opinion, these were yet to gain ground.

The absence of fast internet connectivity was a factor that hindered the possibility of rapid development of ICT-based learning, teaching, research and management at the universities. Internet connectivity in the universities and other tertiary institutions had been initiated and provided by KENET as early as 1997 with funds from the Leland Initiative, a donor organisation. K14 observed that this was in line with government intention to provide internet connectivity to all educational institutions. From the interviews, it was apparent that KENET has yet to deliver on its mandate to promote networked learning and collaborative research among the member institutions, and that its focus had remained on infrastructure provision to these institutions:

> At the moment, the teaching in the Kenyan public universities has remained very much face-to-face with very little or no multimedia involved. I do not know of any CD-ROM or internet based courses for teachers offered by the universities (K14).

Despite support from the KENET Trust therefore, the student teachers were not trained in an ICT rich environment that would in turn make them competent users of ICT in their own teaching.

The role of institutional leadership in ensuring ICT diffusion at the universities was also singled out by one respondent, K12. He observed that the Vice Chancellors of the universities were yet to recognise ICT as a strategic priority for their institutions:

> Many of them assign very low budgets for ICT in general as compared to other budget areas (K12).

Diploma Teacher Training Colleges

Prior to 2006, the three Diploma Teacher Training Colleges (DTTCs) developed internal curricular in line with their own institutional strategic plans or other internal needs. Consequently, these colleges did not all begin to train teachers of the subject Computer Studies at the same time. However, they each had an ICT skills course for all pre-service teachers. These were, however, introduced at different times, and the content and implementation approach varied from college to college.

Also, prior to 2006, the student teachers sat examinations that were set and moderated internally by the colleges. However, in the year 2006, the diploma colleges had their curriculum reviewed for the first time in 15 years. The new reviewed curriculum was developed in a consultative process involving KIE and other stakeholders from the institutions. The outcome is that KIE now oversees the uniform implementation of this curriculum and student teachers sit examinations set by the national examining body, KNEC. The KIE developed a common course for all pre-service teachers called 'ICT Integration in Education', which is considered as a support course and is therefore non-examinable.

K12 further suggested that the training of teachers at the Kenya Science Teachers' College in ICT skills arose from two factors working together: pressure from parents and also the fact that the college was located in Nairobi. Parents in Nairobi seemed to understand the value of ICT skills in the emerging job market. The local population also began to demand to be trained in basic Computer Skills since the college already had the facilities to accomplish this. This respondent added that it is in response to these factors that the college began to offer

computer skills courses in the late 1990s both to the pre-service teachers and also to the general public at a fee.

The Kenya Science Teachers Training College (KSTC), which trained secondary school teachers in science subjects, had from the year 2003, trained teachers for the subject Computer Studies, offered as an elective subject in secondary schools in Kenya since 1998. K12 observed that the introduction of Computer Studies as a teaching subject at the KSTC was initially driven by the Principal of the college:

> He was a bit flexible and encouraged a number of student teachers to drop one of the initial teaching subjects and take Computer Studies. He particularly targeted students with the Physics-Mathematics combination. This way, he succeeded in producing some of the earliest trained teachers of Computer Studies in the year 2003. This was some five years after the subject had been introduced in the Secondary school curriculum (K12).

Kagumo Teachers College began to offer what they called Computer Literacy for Teachers Course in the year 2000. K15 said that this was an initiative of the BOG, who had provided 20 computers that were used to set up the first computer laboratory. In the year 2001, in partnership with CFSK, a second computer laboratory was set up with another 30 computers. With a total of 50 computers, it was possible to offer the ICT skills course to all the pre-service teachers at the college:

> The course was based on the general application packages and there were no efforts to tie it to the subject teaching and learning. However, there existed an 'understood' rule that a student who demonstrated mastery of the ICT skills during the Teaching Practice earned extra marks for the effort (K15)

It was the feeling of K15 that technophobic behaviour was evident among the teacher educators and this hampered the use of ICT to in improve the teaching of other subjects in the curriculum:

> 75% of the lecturers fear computers and cannot even use projectors. There are also no computers set aside for them and so the few who are

> interested must scramble for the available ones alongside the students. So far, it is the responsibility of the ICT lecturer to teach this course to all students and owing to understaffing, the syllabus coverage can only be superficial. Furthermore, the ICT lecturer cannot effectively demonstrate best practice using ICT in all subjects so the other lecturers will still need to be trained in order for ICT to be an effective cross-curricular subject (K15).

Kagumo Teachers College started training teachers of Computer Studies in the year 2006. K3 suggested that this may have been a result of the demand arising from the secondary schools who were already having students who had expressed interest in the subject yet there were not enough trained Computer Studies teachers leaving the colleges. She further observed that by 2006, a number of institutions were now aware of the government's efforts to promote ICT as an industry in the country and there was need for trained personnel.

At the Kenya Technical Teachers College, the first teachers of Computer Studies graduated in 2001. There was increasing demand for these teachers, both in secondary schools who had followed the national syllabus since 1998, and teacher training colleges that had in-house ICT skills curricular in various forms. At the KTTC, the pre-service teachers were not taken through an ICT skills training in formal lessons:

> We do not want to spend time and resources teaching pre-service teachers what they can do on their own...We focus more on integrating these skills in their daily learning of the subject content (N2).

The KTTC approach was based on the assumption that ICT skills was something the student teachers learnt when they needed to use it and therefore did not warrant a formal common course. Instead the student teachers had access to self-instruction CD-ROMs that they accessed at their own time:

> As part of the capacity building programme, basic ICT skills were offered at the inception of the project. However, the skills were later learnt with the assistance of self-instruction CD-ROMs. The focus of the capacity building programme changes from ICT skills to pedagogy (N3).

The KTTC had collaborated with the Flemish Development Agency (VVOB) to establish the Learning Resource Centre (LRC) at the KTTC in the year 2002 in an effort to foster a teacher education programme with ICT integration at its core. A series of capacity building workshops for both the lecturers and the student teachers were conducted:

> The workshops concentrated on specific education-related themes and tasks, including efficient Internet research, the pedagogical rationale for ICT integration, problem based learning, innovative instructional methods such as flexible learning and information literacy...It was compulsory for the student teachers to attend the workshops as part of their curriculum. (K13)

The LRC was fully equipped with state-of-the-art computers, VSAT internet access and other multimedia teaching and learning equipment. K20 further observed that the LRC was seen as a central facility that would support the teaching and learning of all subjects at the institution. The teacher educators at KTTC used the LRC to deliver ICT integrated lessons to the student teachers. They would model good practice to the pre-service teachers in the process. This project faced some challenges when the donor left:

> The LRC was established by the VVOB and in line with the Ministry of Education policy on ICT integration in teacher education. However, when the donor left in 2007, the project came to a standstill. There has been no support from the Ministry, and the college does not have a vote head for the LRC (K13).

K20 observed that even though this facility was already over-stretched by the large number of student teachers enrolled at the institution, the college organised capacity workshops for other stakeholders in teacher education. This was because the facility also served as an income generating project for the institution:

> Even though this was not a government initiative, I can say that the evolving ICT policy environment favoured its establishment...and other government training institutions paid KTTC to have their staff trained at the LRC...We have trained ICT lecturers from the primary teacher training

> colleges on ICT integration with the expectation that they can organise in-house training for their colleagues at the TTCs (K20).

K19 observed that the training of ICT lecturers from the primary TTCs at KTTC may not have had the anticipated effect since the leadership of the TTCs did not provide direction that would have created the enthusiasm and sense of purpose needed for the project to be launched at college level:

> The initiative did not have the multiplier effect that it was supposed to have. The Principals are used to getting circulars from the Ministry and there could have been the fear of supporting something that did not have explicit support from the Ministry...so it died a natural death (K19).

K3 also observed that it had been a one-off kind of training that was unlikely to yield any useful outcome. She felt that even though KIE had not designed a teacher development curriculum that infused ICT, KTTC should have had the training materials approved by KIE before training the TTC lecturers using their own internal materials.

Primary Teacher Training Colleges

The 21 public Primary Teacher Training Colleges (PTTCs, also often abbreviated as TTCs) in Kenya train teachers who specialise in a few subjects and also take ICT as a compulsory separate subject. Unlike the secondary schools, ICT is not taught as a subject in primary schools in Kenya and so the pre-service teachers in TTCs do not study it as a potential teaching subject and it is not examined by the Kenya National Examinations Council (KNEC).

From my interviews, it emerged that all the TTCs had computer laboratories that were dedicated to training the pre-service teachers on ICT skills prescribed in the national syllabus published by the Ministry of Education in 2004. The Ministry of Education had earlier disbursed funds to all primary TTCs for purchase of 25 computers each. K26 reported that 3 out of the 21 public colleges had, however,

set up computer laboratories prior to the official publication of a formal ICT curriculum by the Ministry of Education. The respondent observed that one college had a champion Principal who had taken an ICT conversion course at Masters level, while two other colleges had received funding and other support from UNESCO to set up laboratories and run ICT literacy courses:

> In our college, the Principal herself already had a Masters level qualification in ICT and she therefore understood the need for teachers to have basic ICT skills... The College Board of Governors resolved to levy some fee which was used to set up the first laboratory in 2002. It had 30 computers and was used mainly to train the student teachers on the basic ICT skills...I would not say that this was directly influenced by the government policy on ICT (K26).

In the opinion of K19, the provision of funds by the Ministry of Education to equip the first laboratories marked an official move by the Ministry to implement government ICT policy to offer basic ICT literacy skills to its workforce. I gathered from the interviews that the computer infrastructure was in most instances limited to one computer laboratory, and the computers were neither networked nor connected to the Internet. The computer laboratory was considered inadequate in most colleges particularly for the delivery of an ICT integrated curriculum to the pre-service teachers.

The introduction of ICT skills training in teacher training colleges for pre-service teachers in 2004 can be said to have been a direct result of government policy to impart ICT skills on its citizenry in general and on its teaching force in particular. As indicated by K7, ICT is supposed to be a 'service subject' in the TTC curriculum as stated in the ICT syllabus for primary teacher education, and added that ICT integration in subject teaching is only implied in the objectives of the syllabus:

> It is stated in the syllabus that the syllabus seeks to address the technologies, skills and concepts that a teacher is expected to demonstrate in order to be able to use computers and their related technologies to support the instructional process in their various subjects. In my opinion,

> this is the closest that the syllabus comes to ICT integration in subject teaching...Yet the content of the syllabus focuses only on ICT skills (K7).

K7 understood this to represent the ICT policy intention for teacher education on one hand, and the 'under-representation' of this intention by the curriculum development agency, KIE, the immediate implementer of the policy. The scenario presented by K7 demonstrated a situation where the existence of different policy implementation levels presented a challenge to the implementers of the actual teacher education programmes. Faced with a policy and a syllabus that purports to re-present the ideals of that policy, it is likely that there were differences in the interpretation and implementation of the ICT policy in various teacher education programmes, not only at the primary teacher education institutions but also in other teacher education programmes across the country, particularly in the period 2000-2005 when the national ICT policies were undergoing very rapid evolution.

As part of the implementation strategy for the ICT policies in teacher education, there were also a few programmes that were designed for the teacher educators in primary TTCs. K18 reported that the teacher educators in TTCs had been taken through an ICT skills course by Microsoft's *Partners in Learning Programme* (PILP) in the year 2005. This came in the same year that *the Draft ICT Strategy for Education and Training* and the *Sessional Paper No 1 of 2005* were published, both of which emphasised the need for an ICT literacy workforce and ICT integration in education. I found it difficult to determine whether there was a causal link between the ICT policy activity within the country at the time and this training, which was a collaborative initiative between Microsoft and the Ministry of Education. Its success level was not clear among respondents:

> The CD-ROM based ICT skills course, which had an initial 10-day college-based face-to-face session, was a certified course that should have taken place in 3 phases, targeting at least 20 lecturers in each of the 21 colleges

> in each phase. This never came to be since only the first 20 lecturers were trained....I cannot tell whether or not the programme was directed or influenced by policy (K18).

With regards to teacher educators, K18 indicated that whereas the Microsoft PILP course of 2004 largely conformed with the Ministry of Education policy intention to integrate ICT into teacher training, the programme needed better planning in its execution, more time for ICT skills training and more focus on subject-specific integration skills. This would enable the teacher educators to integrate ICT in their teaching subjects as they trained the pre-service teachers. K19, who had participated in the Microsoft course, indicated that it had not benefited him much:

> It was all so rushed up and had not been beneficial towards enabling us to integrate ICT in our teaching subjects. The content on ICT integration was largely theoretical, simply justifying ICT subject integration and failing to train us on subject specific ICT integration strategies. And after that first phase, we never heard from Microsoft again (K19).

ICT integration involving older technologies had been attempted in TTCs to varying degrees. One respondent (K16) said that there were multimedia resource centres that had been established by the World Bank in the 1980s to facilitate resource based learning and teaching in all the primary teacher training colleges in Kenya. The student teachers and the teacher educators were supposed to use the Learning Resource Centre (LRC) equipment which included radios, audio cassette players and VHF video recorders to support training and micro-teaching. The lack of clear government policy on sustainability of the LRCs may have meant that the LRCs did not serve the purpose for which they had been established:

> The LRC managers were not trained on how to operate the equipment, so when the equipment broke down they could not repair them. The other lecturers do not know what is in the LRCs... I understand some of the equipment are still lying in the boxes unopened...Other alternatives to micro-teaching that do not involve multimedia are preferred by the lecturers because the LRC equipment is not operational (K2).

Regarding use of computers, it was the opinion of K3 that the ICT Teaching Guide for Primary Teachers Training Colleges would guide the ICT lecturer in ICT integration since the topic was missing in the syllabus:

> There was this workshop that you attended, where KIE had invited ICT lecturers and other stakeholders to develop a teaching guide for the ICT syllabus for TTCs in the year 2005, just as was the practice with other subjects....The teaching guide would usually conform to the content of the actual syllabus. But you remember the participants decided that content on ICT integration in education had to be included and the role of the Head of ICT department at the college be re-defined so that he or she would assist the other lecturers with integration of ICT in the other subjects (K3).

In this guide, the role of the ICT Department in the college was re-defined to include providing direction and leadership to the rest of the college with regards to ICT integration in other subjects. Some respondents, however, felt that the enrichment of the content of the ICT Teaching Guide for PTE may not have changed the teaching and learning of ICT to the pre-service teachers and also the use of ICT in other subject areas in the colleges, probably owing to lack of capacity building and internet connectivity:

> The focus is still on ICT skills and I have not been involved in any forum training me on how to integrate ICTs in my own teaching subject, which is Business Studies. I do not have any teaching materials in soft form. We have no internet access so it is difficult to integrate ICT in the lessons as required by the ICT policy (K21).

Many respondents cited inadequate ICT infrastructure as one of the barriers to ICT integration in teacher education at the colleges:

> We are aware that the government policy requires that we use the computers to teach our subjects. But if you look at the college timetable, that computer lab is occupied all the time because all 18 different classes [of pre-service teachers] are supposed to be taught the subject ICT for at least 1 to 2 hours a week. That leaves no space for using the facility to teach any other subject, let alone using it for my own professional development or lesson preparation (K16).

Owing to the presence of computer labs in the teacher training colleges, they were also seen as safe and practical places to host the e-learning content that had been

developed for primary schools by KIE in partnership with the *Tafakari* Project. K5 indicated that the e-learning content for the teaching of science and mathematics in primary schools had been produced and would be delivered through video and computer-based media in 2008. K7 observed that the e-content was to be hosted by the TTCs not only because the primary schools did not have the relevant ICT infrastructure but also to encourage use of e-content in teacher education:

> This initiative will encourage use of e-content in the education institutions since the material is based on the primary school syllabus... the lecturers in the TTCs are expected to use the material to prepare the pre-service teachers...but we are yet to see the extent to which e-content developed for primary schools is going to determine how teachers are trained in teacher training colleges (K7).

It was apparent to K2 that the implementation of the *Tafakari* project was likely to stretch the limited ICT resources in the colleges even further, especially if the colleges were going act as e-content Resource Centres for the neighbouring primary schools as intended. Again, whereas there was e-content development going on for both primary schools and the colleges, the structures for the delivery of this content to the pupils had not been put in place. According to K6, lecturers at the colleges had not been trained on the use of e-content but plans were underway to give them an initial 1-week face-to-face orientation. Some help facilities had been built into the CD-ROMs. She however expressed pessimism on the extent to which the e-content would transform teaching at the colleges.

6.2 Perspectives on in-service teacher Training Programmes

In Kenya, teachers of secondary schools are trained both at the Universities and the Diploma teacher training colleges. All secondary school teachers have at least two teaching subjects. Teachers in primary schools are trained in PTTCs. Lately, however, some graduates of DTTCs are deployed in primary schools, especially those who specialise in the humanities. Once deployed to teach in the secondary and primary schools, teachers have periodic access to in-service and professional development programmes. A number of these programmes are jointly organised by the Ministry of Education and donor organisations.

Training programmes for Secondary School Teachers

There are a number of in-service training programmes linked to ICT offered to secondary teachers, these include the in-service training programmes offered by the Computers For Schools Kenya (CFSK), which is an organisation that initially provided computers to specific partner secondary schools across the country . Where teacher training was offered, it was based on the CFSK's own curriculum which was essentially ICT Skills at the outset, but later included units on ICT integration in subject teaching. The CFSK teacher training curriculum was modelled around its partner project in Canada, and has since expanded to include ICT subject integration skills, among other skills:

> The CFSK was founded before there were any clear ICT policies in place. It is hard to tell the extent to which their teacher training programmes conform with the current ICT policies. But I assume they conform, otherwise they would not be allowed to access the secondary schools (K10).

In line with this, K10 indicated that a number of secondary school teachers that he knew were reasonably computer literate despite their schools not having computers; they were able to use basic word processing software and e-mail. He attributed this to the fact that there was increasing need for teachers to have these skills outside the routine school functions. He further observed that a number of teachers had also enrolled for graduate and post-graduate courses in local universities, many of which were beginning to lay conditions around assignment processing and submission which required these ICT skills.

ICT-subject integration was the focus for a number of ICT programmes targeting secondary school teachers such as the CFSK programme. K4 observed that whereas the Computer Studies teacher was perceived as 'a champion of sorts' in some schools, in her experience, such teachers often lacked the capacity to train their colleagues on ICT integration in their own subject areas. The presence of a Computer Studies teacher in a secondary school did not, therefore, automatically translate to innovative use of ICT in other subjects in the curriculum in the same school.

The interviews with key people also revealed that there were a significant number of teacher education programmes where there was widespread use of ICT owing to association with Non Governmental Organisations, or other related external influences. K6 cited the secondary schools involved in the NEPAD e-schools demo project, which had been provided with a state-of-the-art computer laboratory, Smart Board™ and a VSAT internet connection. She said that the teachers from all the 8 NEPAD e-schools were then taken through a training programme that involved an initial centralised training of two ICT champions from

each NEPAD e-school, and a subsequent on-going school-based training in each school, conducted by these champions:

> The NEPAD e-schools initiative enjoyed the full support of the government since it was a Pan African project... The school-based training, however, was not very well planned...Teachers are using ICT. But I doubt you will find teachers who will tell you precisely what they have learnt and how they are using it to improve learning...the e-content that they are using is foreign to our syllabus and that is one of the reasons KIE is developing local content as a matter of urgency (K6).

K7 was of the opinion that NEPAD, being a regional initiative, determined the teacher training content and focus. The NEPAD e-schools programme therefore followed a contextualised curriculum and approach developed for all the participating countries in Africa, including Kenya.

Other respondents indicated that a number of training programmes on ICT integration in subject teaching had been, since 2006, organised for secondary school teachers by Kenya Education Staff Institute (KESI), a Semi-Autonomous Government Agency (SAGA) under the Ministry of Education. These targeted Principals, Deputy Principals and Heads of Department and it was the opinion of K7 that the impact of these courses on actual classroom teaching was yet to be felt since many schools were yet to purchase computers in the first place.

Training programmes for primary school teachers

Since ICT was introduced in a number of Primary Teacher Training Colleges as from the year 2000, a number of practicing primary school teachers who graduated earlier than the year 2000 were not formally trained on ICT skills. Moreover, only a small percentage of primary schools in Kenya have computers (K7) and it therefore follows that not too many teachers in primary schools have access to computers at school.

Many respondents observed that a number of teachers in primary schools known to them had basic ICT Skills despite not having access to computers in their schools. K20 observed that this may have been occasioned by the same factors that influenced the secondary school teachers; demands by the graduate and post graduate courses that the teachers had enrolled in and also the need for word processing and e-mail skills for social interaction and related functions.

The School Empowerment Programme (SEP), introduced in the year 2005 (See: Chapter 5), had been the only programme that involved primary school teachers that had the promise of developing an ICT-enhanced professional development programme for teachers in primary schools in Kenya:

> The SEP succeeded in the initial implementation using the older technologies of print, radio and video but never got to the stage where the more modern ICTs like the Internet and CD-ROM were used (K1).

6.3 Conclusion

The interviews with the key stakeholders identified for the study suggest that there were teacher training programmes involving ICTs both for pre-service and in-service teachers. From the examples cited by the respondents, the following key points are evident:

- The existence of different policy implementation levels might be responsible for the many different ways in which policy is actually interpreted and implemented. There is a range of implementation approaches and a general absence of capacity in the institutional administration to appreciate the role of ICT in teaching, and provide leadership in the implementation process. For instance, the heads of institutions of higher learning devote

insignificant funds ICTs in general. Also, a principal of a TTC who has previous training in ICT are proactive in introducing ICT in the training of pre-service teachers. The significant role played by institutional leadership, donor organisations, NGOs and SAGAs in determining how ICT policies are implemented in various teacher education settings has been underscored by a number of respondents.

- In their teacher training programmes, the universities in Kenya, DTTCs and PTTCs have adopted ICT policy implementation models where power rests with a specific ICT department that determines the ICT course content which is taught to all, including student teachers. This is probably an influence from other science subjects in the curriculum that have dedicated labs for the teaching of practical aspects of the subject. The ICT curriculum content varies from basic ICT skills to more sophisticated content in software engineering and networking applications. Whereas the universities have been slow to embrace ICTs for pedagogy, there is a focus on ICT as a discipline. There is little evidence on the use of ICT among teacher educators at the universities, DTTCs and PTTCs

- DTTCs and PTTCs initially focused both on training teachers for Computer Studies and also developing the capacity of teachers on general ICT skills. During the period 2004 – 2007, which also saw tremendous activity around national ICT policy making, there was a renewed focus on ICTs for pedagogy in teacher training. However, in some instances, implementing this presented challenges both at curriculum development level and at the institution and programme level. This is evidence of the challenges of

implementing policy in a top-down highly stratified policy development and implementation context.

- Provision of ICT infrastructure, especially computers, is a key priority in all the institutions and teacher education programmes. Restrictions on computer lab access seemed to be responsible for the apparent disinterest in ICT use for teaching among teacher educators. Besides, many of the teacher educators seemed to lack the competence required to use ICT effectively in their context. Owing to this, many did not appreciate the integral role that ICT would play in the delivery of their subjects.

- Whereas in-service ICT training involving practising teachers in primary schools is still limited, training programmes for secondary school teachers were more readily found. These initially focused on offering separate ICT skills courses. However, with the increasing involvement of Non-Governmental Organisations and SAGAs like KESI, there was renewed focus on ICT-pedagogy integration in in-service teacher education programmes for secondary school teachers.

- It is evident that a number of activities that take place in the teacher education programmes with regards to ICTs occur without the teachers or the institutional leaders being aware of the provisions of the national policy. The teachers and teacher educators tended to respond to circulars from the Ministry of Education, and in the absence of this, they were slow to embrace innovative implementation of ICT in their respective institutions.

- Three approaches to ICT implementation in teacher education begin to emerge in this Chapter: first were those approaches aimed at preparing

teachers who will make a career by teaching Computer Studies as a subject in secondary schools. With varied levels of success, this cadre of teachers is sometimes relied upon to determine how ICT is used in the teaching and learning of other subjects at the institutions where they work.

- The second approach prepared teachers to have basic ICT skills and knowledge, besides their professional training. This category of teachers was exposed to ICT as a discrete skills subject in the curriculum during their training. Even though there were often no explicit links between ICT and their teaching subjects, it was expected that the trainees would be able to use ICT in innovative ways to improve learning outcomes in their classes.

- The third approach prepared teachers who could use ICT for pedagogy in their classroom teaching, in a manner that conforms with Tubin's Type II approach to ICT implementation (Tubin 2006) and also the teaching practices encouraged by Type II applications proposed by Maddux, Johnson, and Willis (2001). These approaches make available new and better ways of teaching and learning, and therefore see technology as a core tool in teaching without which it would be difficult to attain the same learning objectives. My interviews reveal that the focus in this approach was not on ICT as a subject or a skill, but more on the kind of learning that ICT was able to facilitate. Having been exposed to this kind of training, the teachers were expected to be able to competently use the ICT skills acquired in the classroom and also be able to focus more on the teaching strategies made possible by ICT in order to attain their learning objectives.

CHAPTER SEVEN: THE CASE STUDY

7.1 CASE 1: NEPAD e-schools programme

Background

Case 1 examined the NEPAD e-schools initiative teacher training programme. The New Partnership for Africa's Development (NEPAD) is a continental initiative formed in 2001 as a strategic framework to address the various developmental challenges facing Africa (www.nepad.org). The initiative recognised that ICTs would play a key role in accelerating economic growth and development. This led to the formation of the e-Africa Commission (eAC) in 2001, that would 'manage the structured development of the ICT sector in the African continent in the context of NEPAD' (NEPAD e-Africa Commission, 2007:1). The eAC liaised with NEPAD Heads of State and other stakeholders that included the Ministry of Education in each participating country, and software and hardware giants HP, Cisco, AMD, Oracle and Microsoft. They identified six high-priority ICT projects which included the NEPAD e-schools initiative (Farrell, Isaacs and Trucano, 2007).

This initiative was adopted as a continental enterprise that would ensure that the youth in Africa graduated from school with skills that would enable them to participate effectively in the global information society. The aim was to impart ICT skills to young Africans in primary and secondary schools as well as harness ICT technology to improve, enrich and expand education in African countries (NEPAD e-Africa Commission, 2007). The initiative embraced 'a holistic approach that provided infrastructure (computers, communications, networking, power), ICT training for teachers, content and curriculum development and efforts at

community involvement and ownership of the process' (NEPAD e-Africa Commission, 2007). Besides providing school managers with ICT skills to facilitate efficient management and administration of the schools, the project also aimed at making every learner health literate by exposing the learners to health-related resources and information.

These intentions were in tandem with the national ICT policies that aimed at investing in ICT education and training. In the *Economic Recovery Strategy for Wealth and Employment Creation 2003-2007* published in 2003, the government had expressed its aim to streamline the education curriculum to incorporate IT studies in order to develop appropriate skill requirements. In the same document, it was stated that Information and Communications Technology would be 'important to the realisation of the required improvement in productivity and empowerment of the citizenry' (Republic of Kenya, 2003:p55). The government's commitment to the NEPAD initiative was demonstrated in the *Sessional Paper No 1 of 2005: A Policy Framework for Education, Training and Research,* which stated:

> The government will work with stakeholders to ensure implementation of the New Partnership for Africa's Development (NEPAD) e-school initiative under the NEPAD e-Africa Commission' (Republic of Kenya, 2005:p81).

Besides being a continental initiative, the NEPAD e-schools initiative met the national ICT policy priorities in Kenya. Provisions around it were specifically captured in national policy documents, particularly those that were published after the initiative had been conceptualized. This demonstrated a two-way policy influences around this particular initiative.

The first phase of the NEPAD e-schools initiative was rolled out in the year 2005 as a Demonstration (Demo) phase across Africa. The Demo, which was initially

scheduled to last 12 months, was intended to generate a body of knowledge based on real life experiences in the implementation of ICT in schools across the African continent. This would serve to inform the rollout of a large-scale NEPAD e-schools initiative.

The Demo phase was implemented by private sector partners organized into five consortia led by hardware and software giants HP, Cisco, AMD, Oracle and Microsoft. It was implemented in six schools in each of the 16 partner countries in Africa. However, despite having been officially launched in June 2003 at the African Economic Summit in Durban, South Africa, Uganda would be the first country to launch the NEPAD e-schools project two years later, in 2005. The Government of Kenya too launched the first school later in the same year. Implementation in all schools participating in the Demo was expected to be complete by end of 2007 (N1). Institutions C 1.1 and C 1.2 , which had been selected as case institutions in this study, are among the six schools in Kenya that participated in the Demo. The Demo went beyond the year 2007, as will be discussed in the subsequent sections.

Documentation obtained from the schools showed that the NEPAD e-schools initiative equipped the participating schools with a range of equipment including 24 personal computers, a multi-function printer, a GPRS dish for internet connectivity, a Smart board, a 24-inch colour television, a DSTV dish to access DSTV learning channels, a VCR system for recording TV programmes, a DSTV decoder among other things. The equipment was set up in a computer laboratory. Also installed were learning resources for selected subjects.

This Case focused both on the expected and unexpected policy outcomes and practices with ICT with regards to the teacher training and capacity building

programme. In order to determine this, data was drawn from an analysis of project documentation and also interviews with stakeholders and teachers at the e-school.

The documents analysed included the curriculum and training materials for the NEPAD-Kenya Capacity Building and Training Programme for NEPAD e-schools, NEPAD e-schools Project Documentary, the *NEPAD e-schools Demonstration Project: A Work in Progress – Public Report* and *The NEPAD e-school initiative: Draft Report for the NEPAD e-Schools Business Plan*. Internal documents at the e-schools analysed included an assessment report entitled C 1.1 Impact Assessment of the e-Learning Process.

Interviews were carried out with officers in charge of the NEPAD e-schools programme at the NEPAD Secretariat, the Kenya Institute of Education, the Ministry of Education and lecturers at the Kenya Technical Teachers Training College (KTTC) who had been engaged as trainers by NEPAD (See: Chapter 4). At each school, a total of 6 respondents were interviewed. These included the Principal of the institution, the Chairman of the Board of Governors, the ICT Champion, the Director of Studies and 2 teachers representing different subject clusters.

7.1.1 Training before the NEPAD e-schools programme : 1998 – 2005

The respondents interviewed at C1.1 and C1.2 reported that there had been ICT related training programmes organised for the teachers in both schools prior to the inception of the NEPAD e-schools programme. In C 1.1, respondents described the training provided by a Non Governmental Organisation called *Click.Org*, whose main intention was to provide basic ICT literacy skills to the teachers to enable them introduce Computer Studies as an examinable subject at the school.

Two respondents at C 1.2 (N12 and N13) reported that their school administration had been intent upon introducing Computer Studies as an examinable subject and therefore saw the need to have a few pioneer teachers trained to teach the subject since there were no teachers officially deployed by the Teachers Service Commission to teach it. They said that teachers were drawn from other subject areas and trained to become Computer Studies teachers:

> Computer Studies was introduced in this school in 1998 and in the Kenyan curriculum in 1995 or 1996. And at that time the universities were not producing Computer Studies teachers because Computer Studies itself as a subject was not being taught in schools. So they were not producing teachers for the same (physics teacher: C1.2-N12).

The first teachers specifically trained to teach Computer Studies at C1.2 had been posted to the school by the TSC in the year 2006. Even though they had been trained to teach the subject, the three pioneer teachers of Computer Studies at C 1.2 said that they considered it an extra subject and did not count it as one of their official teaching subjects. The respondents observed that they had to make extra efforts to cope with the requirements of the Computer Studies syllabus:

> [My teaching subjects are] Maths, Physics and Computer. I am not trained in Computer but it's out of interest that I decided to teach and train on the job (head of ICT department: C1.2-N13).

It emerged from the respondents that as early as 1998, the Universities were playing a crucial role in conducting school based training for prospective teachers of Computer Studies. The teachers said that they had been trained by a lecturer from [X] University who was paid by the school to introduce them and other teachers to computers in order to prepare them to be teachers of the subject Computer Studies:

> There was a lecturer from [X] University who actually came to introduce us to computers. And we started actually from scratch in this very room. We did not know anything about computers. So you know we were supposed to go through that training so that we could also train others to teach the subject. (physics teacher: C1.2-N12).

Those interviewed at C1.2 said that the existence of a group of teachers who had previously been trained to teach Computer Studies prior to the time that the NEPAD e-schools programme commenced helped in the efficient and smooth implementation of the programme: The respondents articulated the different roles played by the Computer Studies Department and the NEPAD e-schools Programme which was hosted at the ICT Department in the school:

> When you look at NEPAD we are looking at how computers can be applied in everyday life. How can you be able to access information? How can you be able to access the knowledge you have in computers to communicate with the students and the general public. But Computer Studies is actually meant to teach about the computer itself, the parts of a computer, how they work, classifications and so on (physics teacher: C1.2-N12).

The respondents from both institutions indicated that Computer Studies was currently being offered as an examinable subject in the curriculum. Whereas it remained an elective subject in C 1.1 as from Form 1, it had been made a compulsory subject for all students in Forms 1 and 2 in C 1.2 and remained an elective subject in Forms 3 and 4:

7.1.2 The NEPAD e-schools capacity building and teacher training programme

The NEPAD e-schools teacher education programme was anchored on a long term strategy to provide capacity building in ICT for teachers. It intended to create a critical mass of trained teachers in ICT in every school in the country (NEPAD Kenya, 2007). Besides assisting teachers to be able to use the internet to access digital libraries and other relevant e-content, the NEPAD e-schools teacher education programme also aimed at training teachers to integrate ICT into teaching and learning.

According to the training workshop documentation, the teacher training model adopted by the NEPAD e-schools initiative in Kenya involved an initial 2-week face-to-face training of two to four Champions[6] from the participating schools who would then train colleagues in an internal school-based programme back in the schools. This initial training was organized by NEPAD and the Ministry of Education in partnership with KTTC. Prior to this, some consortia members had inducted the teachers in the demo schools into the e-school programme. There had also been individual efforts by schools to build capacity among teachers in internal training sessions.

The objectives of the curriculum offered at the capacity building workshop held at KTTC focused on ICT integration into subject teaching, generic ICT skills building and preparation of champions to mobilize the communities to embrace, support and benefit from e-learning. The workshop documentation7 indicated that at the

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[6] 'Champions' were teachers who were nominated by their schools to be trained at a central training venue. They were then expected to train their colleagues back at school on the same content that they had been exposed to during their training

[7] Available in a PowerPoint presentation given at the workshop by the NEPAD liaison officer at the Ministry of Education, and which was availed to me by one participant.

end of the workshop, the participants would be confident enough to integrate ICT into teaching and learning in all subjects. It further stated that the teachers would conduct school INSETS so that no teacher in the e-schools would be found to be ICT illiterate. The documentation suggested that the e-schools should be reference points for e-education and e-learning in the communities and the country as a whole.

Training teachers on ICT-pedagogy integration was a key component and this was reflected in the time allocated to this topic in the training schedule. ICT skills of word-processing, spreadsheets, databases and the internet were only reviewed in a one and a half hour session at the end of the day. The topics covered are presented in Figure 7 below, and a full schedule of the training programme and resources are available in Appendix 4.

1. Introduction to ICT integration in Education
2. Strategies of Integrating ICT in the classroom
3. Development of ICT Integration tools
4. Principles of e-Learning
5. e-Learning Platform
6. Internet: Application, evaluation of materials, references etc
7. Etiquette
8. Literacy redefined
9. Approval and regulation of e-content
10. Internet Research Strategies
11. Problem Based Learning (PBL)
12. Application of e-tools
13. ICT Policy Making, and
14. Digital Libraries

Figure 7: Topics covered in the NEPAD e-schools teacher training and capacity building programme

Whereas the intention to train teachers who can use ICT innovatively to realise learning outcomes was clearly reflected in the training materials, it was not clear

how these teachers would become 'ICT teachers' as indicated in the project documentation. At the end of the workshop, the participants were awarded a certificate of attendance (Appendix 11). The structure of this training programme was developed centrally by the NEPAD eAfrica Commission and was therefore uniform across the participating countries.

7.1.3 School level implementation

Capacity building in ICT skills and ICT-pedagogy integration

The initial capacity building programme aimed at training at least two Champions and a further two teachers from each NEPAD school. The bulk of the training for the rest of the teachers took place at school level. A trainer in the initial face-to-face training workshop indicated that the same training materials used at the initial training were intended to be used for the school-based training.

In both institutions visited, the teachers who had been trained at the initial face-to-face training at KTTC adopted a cascade training model for the other teachers at the school. At departmental level, the teachers who had been trained in various departments were expected to train their colleagues in their respective departments:

> We induct the teachers, because we were trained on how to use some of the facilities that we were seeing for the first time like the Smart Board. So we were trained on how to use them and when we came back here, we trained teachers in all the departments on how to use them. And so teachers are now using them to teach students...Our training is kind of exponential. I do not have to train everybody. I trained the first ten teachers. And then these ten teachers trained the remaining teachers. Then it went also to the departmental level. So I want to believe that the remaining few, less than ten, can be trained at the departmental level (head of ICT: C1.1-N7)

The teachers interviewed variously referred to the school-based training as 'in-service', 'briefing', 'workshop', 'induction' and 'informal trainings'. But, it emerged that the school based training sessions were informal and unscheduled:

> When they came back, they had some content that they had been given. They put it in the server. So they had to *in-service* us on how to use some of these programmes. Most of them were actually programmes that were meant to enhance content in other subjects like Mathematics, English, Geography. The only thing that was missing there was Kiswahili but the rest of the subjects were there. Then they also *in-serviced* us on how to use the Smart Board and so on, which was a relatively newer technology. Actually you know that *training* they went for was only for all the schools that were running the computer based NEPAD programme. So they went to be *briefed* so that they could come back and *brief* others *[Emphasis own]* (director of studies: C1.2-N12).

But the focus for the school based training was predominantly on ICT skills rather than ICT pedagogy as had been the case for the training of the Champions. N8 observed that this was because the Champions had been teachers who already had some ICT Skills and did not therefore require further training on the skills. Participants observed that teachers in both NEPAD schools showed great enthusiasm to be trained in the basic ICT skills to enable them access the e-content that had been provided.

The Head of ICT in C 1.2 said that they had based the training on what he and his counterparts interpreted to be the needs of the teachers. He indicated that for on-going support, they directed the teachers to the *Help* facility in the software and encouraged them to continuously consult with them:

> No. It's not really written, but at least we look at the needs that we have. And then from that we will need to develop a version when we are training them. So in my judgement, the needs of the teachers are more around the ICT skills...than around the theories behind ICT integration for instance (head of ICT: C1.2-N13).
>
> We normally ask them to use the Help facility in the programmes. They also do consultation here in the lab (biology teacher: C1.2-N16).
>
> Yes we have some home grown approach. No it's not on paper (physics teacher: C1.2-N12).

One respondent (N12) observed that one of the reasons that made it difficult for them to fully follow the NEPAD curriculum was because of lack of adequate time:

Even though the departments in C 1.1 were expected to carry out training at departmental level, the ICT Department in the school still played a central role in training the teachers. Those interviewed said that staff in the ICT Department, who are themselves trained teachers of other subjects in the curriculum, were constantly training the rest of the teachers whenever these teachers needed to be trained.

The teachers' perception of 'a trained teacher' in the context of the NEPAD e-schools training was varied. Some teachers felt that they were trained and ready to deploy the skills that they had when they were competent in word processing and related basic ICT skills. Others felt that they were competent when they were able to use ICT to search for information and pass these on to the students.

The Head of ICT at C 1.2 described the training sessions that they had conducted in the recent past. He referred to it as 'infusion' and understood the approach to encompass both the ICT skills and ICT subject integration:

> So what we now do is that we now do some sort of what we call infusion; that we are able to combine the skills and the pedagogy at the same time. Like for example when they are learning *Word* or when they are learning about *PowerPoint* then they are able to make presentations for their subjects as far as their lessons are concerned. Then we even give them templates of a lesson plan, an ICT lesson plan, how it should be able to look like. So we just bring in those ideas as we teach them the skills (head of ICT: C1.2-N13).

However, some Champions believed that the training in ICT skills was not a priority and that it should instead be integrated in an approach that focused on pedagogy. It also emerged that despite the training, a number of teachers in the

NEPAD e-schools were reluctant to use computers on a daily basis. One respondent observed:

> I think there are limitations and one of them is that most of the teachers are afraid to handle computers, they are technophobic. That is one challenge we have. And that is one of our drawbacks in the development of ICT in teaching and learning (chemistry teacher:C1.1-N9).

ICT integration in the classroom

- **Infrastructure**

It was a common feeling among the respondents that the laboratory was not suitable for effective teaching and also for access by teachers who might wish to be trained using the same facility. N7, the Head of ICT at C 1.1 who had been trained as a Champion remarked:

> First, we routinely use the laboratory to teach [the subject] Computer Studies...We offer a total of 13 subjects in the curriculum. If all 13 subjects were to be taught here, we cannot programme that one. So because of infrastructure, one lab, one subject has so many lessons in a week. So within a week a teacher can only have one lesson in the lab (head of ICT: C1.1-N7).

In C 1.1, there were discrepancies between the kind of infrastructure that the teachers had been made to expect during their training and the actual infrastructure that was made available in the schools. The teachers said that they had been prepared to teach in a set up that would enable both students and teachers to access computers in classrooms. With the computers placed in a single room, one respondent said that he had found it difficult to implement the teaching strategies learnt during the training owing to infrastructure constraints.

> There is no way we could, because when we were being trained, we were told that the computers will be installed in classes. But we never saw that. If every teacher has to take a class there and it is one laboratory, it doesn't work. We tried that and there was a problem already (biology teacher: C1.1-N8).

Even though there were no computers in classrooms in C 1.2 as well, the respondents indicated that the school administration had improved on the computer infrastructure and internet connectivity as both students and teachers had reasonable access to computers. This was attributed to the compulsory nature of Computer Studies for all students in Forms 1 to 4:

> ...We end up with about 20 students taking Computer Studies. So the remainder of the students would not have access to computers. But right now, with the NEPAD programme a new timetable was made requiring all the students from Form 1, Form 2, Form 3 and Form 4 to at least have two lessons per week when everybody will come to the ICT lab and be taught the basics of Computer and how to access information (head of ICT: C1.2-N13).

> Teachers are free to access this ICT lab and the second ICT lab also known as the Media Centre. But then they are also free to use the computers found in some select departments. Some departments have computers, like the examinations department has several computers. So teachers are also free to use those computers (physics teacher: C1.2-N12).

The feeling among the respondents was that one well equipped and networked laboratory with internet access was a good start towards introducing ICT in the schools and enabling teacher training in ICT skills and integration. However, some felt that it was not sufficient in facilitating effective ICT pedagogic practice across the subjects in the curriculum. Lack of adequate access to computers therefore prevented teachers in C 1.1 from using ICT in their daily teaching despite having received training to support them in doing so. They added that frequent Internet downtimes and power outages compounded the problem.

- **ICT for pedagogic practice**

The Champions in this Case were themselves teachers of specific subjects in the curriculum and so it emerged that they were able to support other teachers in ICT integration in their various subjects only to a limited extent:

> After training the teachers and showing them where they can find the contents like the online libraries, its now up to them to find out which materials are suitable for their subject and how these fit with their lesson plans. Because the contents are all there, it is up to them to know which one is suitable for their students and which one is not (head of ICT: C1.2-N7).

A number of respondents in C 1.1 seemed to perceive ICT as an add-on to normal subject teaching rather than a core component integrated in their teaching and learning process. The implication is that teaching in this school would essentially

still be considered complete without use of ICT. This approach might be attributed to inadequate infrastructure as implied earlier or to the training model and curriculum that did not place clear expectations and targets for ICT use in the school. It may also be attributed to deeply embedded values and views held by teachers about the curriculum and formal learning. In both schools, the participants indicated that there were no internal audits carried out to establish what targets the teachers were expected to achieve with ICT use:

> No we don't [carry out audits]. Once we realize that they are using the skills to train students, I think that one is an audit enough. That whatever he has acquired, he is now using it to impart knowledge to the students. That alone is an audit (deputy principal: C1.1-N4).
>
> Because they book with me, perhaps I may know the frequency, but frequency may not necessarily translate to effective use. True. That is the challenge I am getting from you. Because that will help me to know how many people have benefitted from this programme. Otherwise we may think we are all ok (head of ICT: C1.2-N13).

Respondents in C 1.2 indicated that each class was allocated time in the laboratory when the students would carry out subject-related research, and that it was not mandatory for a teacher to be with the students. It emerged that if a teacher wanted to expose the students to an aspect in the ICT lab then he could book a slot in the time-table with the Head of ICT Department. These quotes illustrate different ways in which ICT can support learning, perhaps supporting individual study skills and independent study:

> Every teacher has been assigned a class. Each subject is officially allocated a lesson in the lab. So the students know when it is time for that lesson, they come and there is somebody they will find here who will supervise what they do. It is not actually such a controlled kind of thing. If a student has planned, they call them Research Lessons, if a student has designed that he wants to come and do something in Physics, that student will come and either use Microsoft Encarta or some other content that is on the server or when the Internet is active he can actually look for information from the Internet under the observation of the teacher (physics teacher: C1.2-N12).

It therefore appeared that a number of teachers in the two schools used the ICT skills that they had acquired in furthering their traditional teaching styles rather than embrace new teaching strategies that integrated ICT in their subjects as had been envisaged in the training curriculum. The teachers still tended to favour instructivist as opposed to the constructivist approaches to teaching and learning that ICT was supposed to facilitate as stated in the policy documents:

> The teachers here usually do research for students. They search for information and incorporate these in their own notes. This they do for the students. They don't do this for their own learning or training (head of ICT: C1.1-N7).
>
> Teachers tend to get materials from the Internet on their own which they download and then use to update their notes [that they give to the students] (director of studies: C1.1-N6).
>
> After accessing *Google*, we can make *PowerPoint* from *Google* and then we display (biology teacher: C1.1-N8).
>
> There are teachers who just go there and give assignments and they think that is learner centred. So as long as we have not embraced ICT, learning will continue to be teacher-centred (head of ICT: C1.2-N13)

Despite having the requisite ICT skills gained from the training programme, the teachers in the NEPAD schools remained the centre of power since they acted as the sole source of information and did direct learning at the schools:

> ICT will provide new opportunities for teaching and learning including offering opportunity for more student-centred teaching (Republic of Kenya, 2005: p80)

This also raised the question as to the place of ICT in the subject syllabus. Even though the national ICT policies placed emphasis on student-centred approach facilitated by ICT, ICT was yet to be integrated into the national curriculum for secondary schools. Use of ICT was seen by some teachers as being neither necessary nor explicitly recommended to help attain the learning objectives. Despite their training on ICT skills and subject integration therefore, the teachers found that they achieved their learning objectives in a manner that they considered

satisfactory to them, the students and the parents. This did not necessarily involve the use of ICT resources:

> At the end of the day, they [parents] look at my subject column [when the KCSE results are out] and count the number of A's. I cannot get A's by taking students to the lab to browse the Internet. I get the A's by covering the syllabus with the students. So even though I have the ICT Skills, I still teach what is in the textbooks since they reflect the syllabus content. Eventually I get the A's and I get appreciated (biology teacher: C1.1-N8).

In their training, the teachers were exposed to digital content and related teaching material that had been developed in South Africa. This seemed to present difficulties when they got back to teach in class. A number of respondents suggested that the content did not support the local curriculum and some would have preferred content that was responsive to the local curriculum. For others, it was the lack of local content that made the teachers shy away from ICT

Respondents in C 1.2 suggested that even though the content was not tailored for the Kenyan system of education in the first place, the teacher would generally find areas of the content that were within areas of coverage in the syllabus. They said that some content even went into more detail than the syllabus requirements. They also observed that some were below expectation. One respondent opined that the teacher still had a key role in determining what would be taught:

> So its up to the teacher himself to sort of go through the programme first and see which areas would actually be useful for the requirements of the lesson (biology teacher: C1.2-N16).

Those interviewed in C 1.1 held the view that materials to aid teachers in their own on-going professional development were not factored into the programme. The teachers tended to look at the e-content in the computers more as student-focused:

> Except for the Internet where the teachers do carry out their own research for their subjects, materials installed are basically for students. Even

> though there are several teacher development web sites on the internet, I do not see the teachers visiting them (head of ICT: C1.1-N7).

The teachers interviewed indicated that teacher-to-teacher communication and collaboration using ICT within the schools and between NEPAD schools had been impeded by the lack of reliable internet connectivity. They said the Champions had been able to communicate with fellow Champions in sister schools using e-mail, even though this had been to a limited extent:

> It would be ideal where we share with other schools online but we have not taken that initiative. We have not accessed the websites of other sister NEPAD e-schools. In fact even us ourselves, we have not even created a website for our school (director of studies: C1.1-N6).

One respondent in C 1.2 said that they had been able to train other teachers from the neighbouring schools in school based face-to-face training sessions:

> So we have moved around training teachers from neighbouring schools. Some say they don't have computers yet even us in this school we started with one computer (biology teacher: C1.2-N16).

Use of ICT for curriculum development was yet to gain ground at the NEPAD e-schools. The respondents had varied ways of interpreting research and innovation in the context of ICT. One respondent, a Chemistry teacher at C 1.1, was in the process of developing an application that would simulate certain chemical reactions. Even though he had ICT competencies that he considered relatively sophisticated way before the NEPAD training, he said these skills were still limited for the kind of task that he wanted to do and so he needed to contact experts in computer programming to assist with the task. Another respondent in C 1.2 considered his programming capability and knowledge in computer maintenance as aspects of research and innovation in ICT:

> Well I have done programming in computer, the students make programs to compete at the science congress, apply it on computer. Personally I have developed myself to be able to maintain these computers. I think it is an example of innovation when you reach an extent of not just being able

> to use but also make a machine be in usable state, don't you think that is some kind of achievement? (director of studies: C1.2-N12).

Institutional leadership

Those interviewed in both institutions were of the opinion that the success of both the training programme for teachers and the actual classroom implementation of ICT was highly dependent on the external motivation and encouragement that the teachers received from the institutional leadership:

> If you really want these teachers to integrate ICT in their subjects, the motivation must be there. And that these people should be encouraged right from the top, the leadership that is the line we are taking and everybody must toe that line... On ICT you don't compromise. But when the aspect of compromise comes in then everybody will take his way and the easier option (kiswahili teacher: C1.2-N14).

Another respondent was of the view that there was lack of direction from the Principal and the Deputy Principal of the school because they were not good role models as they did not integrate ICT into their teaching. He observed that one was still considered by the administration to have undertaken his duties effectively by teaching using a piece of chalk:

> No. There is no direction from the top. Because I would expect the Principal to integrate ICT in his lessons. And the Deputy Principal. And the teachers would follow. But if it is not done that way then it becomes a bit tricky. So you are pushing them from the ICT Department but some are saying 'You are wasting our time'. There is an option for them to take a piece of chalk, go to class and that is it (head of ICT: 1.2-N13).

The respondents in both schools observed that there had been a change over of leadership in both schools after the demo-phase of the NEPAD programme and this had significantly slowed down the implementation of ICT at the school:

> What has really affected us ... is that change-over of leadership. It really disorients what had been going on and maybe the person coming in does not really understand what it actually entails. So it actually becomes a challenge to really make a follow up (chairman, board of governors: C1.2-N11).

He added that the school had a 'proposal' outlining what was supposed to be done but the new Principal did not quite comprehend what the plan was about and what it was supposed to achieve. In the process, he observed, the Principal interfered with the implementation of the programme:

> Although as I said with regards to change of management, if the management does not buy the proposal then it becomes a problem. Like when we tell them that we would like to put a computer in every classroom, they say what are you talking about? And so its like it reaches somewhere and its like your hands are tied...we are supposed to be having digital content by now according to the plan. We are supposed to be having it. Parents have paid for it. But people [the administration] would say 'the government has not sent us money. So what the parents have paid, lets re-channel it to some other budget'. And so the administration interferes with the implementation (head of ICT: C1.2-N13).

Those interviewed suggested that the new Principals needed training by NEPAD and the Ministry of Education, as had been given to those heading the schools at the beginning of the Demo phase to ensure some continuity:

> When I tell you about change of leadership, the one who went for training left. So there should be that continuity in training for these people. I would recommend that NEPAD and the Ministry of Education still take these Heads especially from these NEPAD e-schools for training (biology teacher: C1.2-N16).

> NEPAD [should] go ahead and do some capacity building and even assess the progress of these schools. After the pilot, it is good for them to continue to monitor [progress] because when one [Principal] knows that somebody somewhere is watching me, people will be able to perform. But if it is us at the grassroots trying to make noise, nobody will listen (member, board of governors: 1.1-N5).

Institutional and national ICT policies

The NEPAD e-schools Capacity Building Programme trained the teachers on the need for a school ICT policy and how to formulate one (NEPAD Workshop Documentation, 2006). However, neither of the e-schools sampled had an ICT policy some two years after inception of the programme.

> Well we did formulate...not really a policy, but we have proposals. These are there but we have not developed them into a policy for our day to day school routine. So it hasn't been translated to something which can be referred to formally as policy (head of ICT: C1.1-N7).
>
> No we only have what we call a proposal which is actually guiding us on what we are supposed to be achieving (head of ICT: C1.2-N13).

Whereas a number of respondents appreciated the value of ICT in their own training and teaching, they said they were not aware of the national ICT policies in education and training. None of the respondents had read the National ICT Policy document and they said there was no copy of the document at the schools:

> So there is a national ICT policy? (director of studies: C1.2-N12).
>
> I have read about it in the media (kiswahili teacher: C1.2-N14).

One respondent said that he had not read the national ICT policy but he assumed that the ICT proposal for the school drew from it. Also, other teachers interviewed perceived the NEPAD e-schools programme to have been conceptualized at a level that superseded internal school policies as observed earlier by C1.1-N7.

7.2 CASE 2: Primary Teacher Training Colleges

Background

The Primary Teacher Education (PTE) curriculum was published in 2004 and is an adaptation of an earlier curriculum first introduced in 1986 and revised in 1994. The issues addressed in the revised curriculum include:

> Harmonisation of the teacher education curriculum with the current revised primary school curriculum, making the teacher education curriculum manageable and evaluative by removing overloads and overlaps, infusing and integration of contemporary issues in order to make the curriculum more responsive to the needs of society and incorporating industrial and technical development (Kenya Institute of Education, 2004: pi).

One of the responses to the new expectations is the incorporation into the syllabus of Information and Communications Technology (ICT) 'as a teaching / learning tool' (Kenya Institute of Education, 2004: pi). The pre-service teachers studied 10 compulsory subjects in the 1st year of their course as presented in Figure 8 below:

1. Mathematics including aspects of Business Studies
2. English including aspects of Library Science, Mother Tongue and Drama
3. Kiswahili including aspects of Mother Tongue and Drama
4. Science integrated with Home Science and Agriculture
5. Religious Education (Christian Religious Education / Islamic Religious Education)
6. Social Studies including some aspects of Business Studies
7. Professional Studies including Special Needs Education, Guidance and Counseling and legal issues in Education
8. Creative Arts (Music, Art and Craft, and Drama)
9. Physical Education
10. Information and Communications Technology

Figure 8: Compulsory subjects in the PTE curriculum

In the 2nd year, which is the final year, the student teachers study five compulsory subjects that include:

- English
- Kiswahili
- Professional Studies
- Physical Education
- ICT

Each student is also expected to study another 4 elective subjects that fall either in the sciences or the humanities subject groupings.

Assessment

At the end of the 1st year, student teachers sit a mid-course examination that is set nationally by a panel of subject lecturers drawn from various primary teacher training colleges in the country (Kenya Institute of Education; 2004). The examination is marked internally by the various subject lecturers in the college and each subject is moderated by an examiner drawn externally from another college (P6). Being a compulsory subject, ICT is examined in the midcourse examination. Students must pass all the subjects in the mid course examination to proceed to 2nd year.

At the end of the two year course, the students sit a national examination set by the Kenya National Examinations Council (KNEC) that examines all eight subjects and Teaching Practice. Even though ICT remains a compulsory subject in second year, it is not examined by the national examinations body owing to the constraints in equipment and general resourcing in some colleges (principal: C2.1-P2).

However, an internal ICT examination is set and marked by each individual college for grading purposes.

The ICT midcourse examination tests both practical skills and theory. Students who fail the mid course examinations are required to re-sit the examination and can only proceed to 2nd Year upon passing the examination. Appendix 7 shows a sample of a mid course Theory and Practical examinations.

Case 2 in this study examined the implementation of ICT policy in a primary teacher training programme. Two colleges, C 2.1 and C 2.2 were selected for the study, which focused both on the expected and unexpected policy outcomes with regards to both the pre-service teacher training programme and capacity building programmes for the teacher educators. Other possible influences on the practices in these institutions were explored.

Data was drawn from an analysis of the various policy and related documents, and interviews with stakeholders and lecturers at the institutions. The documents analysed included the *Primary Teacher Education ICT Syllabus* published in 2004, the *ICT Teaching Guide for Primary Teacher Training Colleges* published in 2005 and C 2.1 Teachers College *Strategic Plan for the year 2007 – 2012.*

Interviews were carried out with officers in charge of Primary Teacher Education at the Kenya Institute of Education and the Ministry of Education. At the college level, a total of 7 respondents were interviewed in each college. These included the Principal of the institution, the Chairman of the Board of Governors, Head of ICT, the Head of Learning Resource Centre, the Dean of Curriculum and 2 lecturers representing different subject groupings at the college.

7.2.1 The PTE ICT syllabus

The ICT syllabus published by the KIE in 2004 falls within the larger revised curriculum for PTE published in the same year. The subject ICT is offered as:

> …a service subject at primary teacher level…it intends to equip the learner with general understanding of ICT skills, tools and devices that may be used to enhance teaching and learning of various subjects in their curriculum (Kenya Institute of Education, 2004: p209).

This statement echoes the dual intention by the government to train teachers who can not only use computers but can also effectively integrate ICT in the teaching of the other subjects (Republic of Kenya, 2005a). The topics to be covered in Year 1 and Year 2 are shown in Table 5 below:

Table 5: Topics in the PTE ICT syllabus

Year 1	Year 2
1. Introduction to Computers	1. Spreadsheets
2. Computer System	2. Databases
3. Operating Systems	3. Graphics and Presentation Software
4. Maintaining and Upgrading a Computer	4. Desktop Publishing
5. Application Areas of ICT	5. Internet
6. Application Packages	6. Data Security and Control
7. Word Processing	

The ICT Teaching Guide for PTE was published in the year 2005 to give the teacher educator clearer guidance on ICT for pedagogic practice in teacher education. This guide placed emphasis on ICT integration across the curriculum and assigned the Head of ICT the role of coordinator who would oversee the implementation of ICT policy in the college:

> This Teaching Guide serves to guide you, the ICT tutor in primary teacher training college, in aptly interpreting the ICT syllabus and adequately preparing for meaningful learning to take place. It is anticipated that your focus is on pedagogy and on ICT integrated learning rather than on technology (Kenya Institute of Education; 2005: pvii).

The guide attempted to enrich the student syllabus which was taught as a skills oriented separate subject in the curriculum. It attempted to close the 'integration gap' that existed in the PTE curriculum and therefore placed the responsibility of spearheading ICT integration in the college on the ICT lecturer:

> Although ICT is currently taught as a separate subject in the curriculum, it should be considered as a cross-cutting skill, used to support learning in all other subjects. This requires collaboration between you [the ICT lecturer] and the other subject tutors in the college. As an ICT tutor, you are encouraged to assist others to use ICT as a teaching learning tool (Kenya Institute of Education; 2005: pxii).

The Teaching Guide, therefore, had a new topic 'ICT Integration in education' in the first year and also brought forward the topic 'Internet' to the first year. The topic 'Maintaining and Upgrading a Computer' was merged with 'Computer System'. 'Application areas of ICT' was also reduced to a sub-topic under 'Introduction to Computers'. The topics in the Teaching Guide are presented in Table 6 below:

Table 6: Topics in the PTE ICT Teaching Guide

Year 1	Year 2
Introduction to Computers	Spreadsheets
Internet	Databases
ICT Integration in Education	Graphics and Presentation Software
Computer System	Desktop Publishing
Operating Systems	Data Security and Control
Application Packages	
Word Processing	

7.2.2 Institutional programmes before 2004

Prior to the introduction of the national ICT curriculum in C 2.1 in 2004, there was an in-house ICT skills training programme offered to the pre-service teachers. They said that this syllabus, which covered basic ICT skills, had been designed by the Principal of the college then, who had herself undertaken training in ICT at Masters Degree level. The college Board of Governors had imposed a levy on the students that was used to buy the first 15 computers and also to remunerate the ICT staff.

The respondents indicated that C 2.2 began to offer ICT as a subject to the pre-service teachers when the national ICT curriculum was published by the Ministry of Education. They said that the college received a government grant to purchase computers. There was lack of trained staff to teach ICT at C 2.2 TTC and the teacher for Agriculture volunteered to teach the new syllabus:

> When ICT was introduced in 2004, there was nobody to teach the subject. So when there was lack of staff I immediately went in and took the first class, made the arrangement and started teaching. There [had been] no

> other ICT skills training programme for the pre-service teachers before the official syllabus was introduced (head of ICT: 2.2-P13).

This ICT lecturer had studied for a BSc in Animal Science and had attended basic computer literacy classes while at the university. He reported that part of the LRC in his college had been converted into a computer laboratory with 26 to 30 computers used to train all the pre-service teachers. This remained the only facility for training students on basic ICT skills since the inception of the programme.

7.2.3 College level implementation

Capacity building for teacher educators

The respondents interviewed reported that in C 2.2, there been no formal training of the teacher educators on ICT skills and that the knowledge that was utilised by the staff was drawn from informal interactions with those in the ICT Department and perhaps experiences outside the institution. Interviews with respondents in C 2.1 indicate that the lecturers did not access the computer laboratory on a regular basis since the college administration had made it clear that the facility was meant only for the teaching of ICT to pre-service teachers. As a result, the lecturers were not motivated to use the laboratory to develop their own skills.

In C 2.2, on the other hand, the respondents said that lecturers were allowed to train on the basic ICT packages in the student laboratory but had to pay a fee since this was an income generating project for the college. Secretaries and other support staff had shown more enthusiasm for the evening programme than the lecturers. The respondents said that an earlier CD ROM based course for lecturers of English ran into difficulties because the college administration did not facilitate the lecturers to access the computers:

> The Head of English Department requested me to dedicate one machine to the English lecturers since the course was CD-ROM based. Naturally I requested for clearance from the administration so that we could release one machine from the computer lab to the English Department and clearance was granted. However, the machine broke down, perhaps due to negligence or too much pressure on the machine by many people. The administration declined to give another machine...So they never went too far as far as I know unless they did it privately, but using the institution's facilities, that one I don't think they went very far (head of LRC: C2.1-P5).

My investigation did not reveal any examples of innovative practice or research using ICT in the college. One respondent (P6) indicated that there may have been some lecturers who were using ICT for their own purposes but it would be difficult to tell what kind of innovations or practices they had come up with, especially if they did not make these public. He attributed this to lack of clear policy:

> If some policy obliged them to let me know as head of [ICT] department of any innovations that they are undertaking then it would be possible for me to make these public as appropriate. Our Deputy Principal is a very ICT conscious person and he's always here [in the computer laboratory] and I think of all the lecturers he is the most interested in ICT (head of ICT: C2.1-P6).

There had been several seminars organised by the Ministry of Education and CFSK. One respondent, however, observed that the participation and attendance by the lecturers had been poor owing to what he attributed to lack of commitment by the college administration and practical support e.g. transport:

> The last one was at Kericho Teachers College and was meant to prepare ICT teachers to train other lectures in the same staff on ICT integration. Our college did not send anyone citing lack of funds and other logistical problems (dean of curriculum: C2.1-P4).

One respondent blamed the Ministry of Education for not adequately preparing practising lecturers to use ICT in their regular pedagogic practice in their subjects, given that the lecturers were trained as teachers prior to the active introduction of computers in learning institutions in Kenya:

> I think the main problem is still the Ministry [of Education]. When things like technology are introduced, lecturers are supposed to be made aware of why those technologies are there and other activities. Most teachers are

> trained to teach and not to use computer, so the computers have been introduced when teachers are already teaching. So the Ministry [of Education] should come up with some programs e.g. if it is English, there must be a lot of programs which can be taught through computers, but because we are not aware of them, it will be very difficult for me (lecturer of English: C2.1-P7).

The national ICT curriculum and the internal ICT programme

Each of the colleges had one central laboratory located in the Learning Resource Centre (LRC) and had between 26 and 30 computers. However, the respondents felt that this facility was inadequate for the effective teaching of national ICT curriculum to the student teachers. Some respondents observed that the absence of internet connectivity tended to frustrate the effective teaching of the subject ICT and that the college administration had not prioritised the installation of the internet for student access. Instead, the limited bandwidth available was used within the administration offices:

> I approached the Dean of Curriculum who proposed to the Principal that we buy a *Safaricom* modem, but the proposal was shot down. After a while we proposed that a *Telkom* wireless line be obtained. It was procured but unfortunately it is only used for administrative purposes (head of LRC: C2.1-P5).

Responses from those interviewed tended to suggest that there was some incongruence between what the national ICT curriculum required and what the lecturers could actually accomplish at the colleges. The ICT lecturer in C 2.1 was not able to complete the prescribed syllabus in the time allocated and therefore only taught extracts of the syllabus:

> Actually the first year I was here, I tried to follow the syllabus with the Guide and the schemes of work that I found at the department, which reflected the syllabus very closely. The schemes followed the syllabus but the Teaching Guide was a separate entity. It was not possible to cover one year's syllabus content. It was not possible to develop competent students using that syllabus. So I decided that when a new group joined 1st year, I would only extract sections of the syllabus that I would be able to cover in the time available (head of ICT: C2.1-P6).

The syllabus that was used at the college had therefore been an extract of the national syllabus that met what this lecturer understood to be the desired capabilities of a graduating teacher. He said that the college administration in C 2.1 had not acted on his request to have the number of hours for ICT doubled in the first year and this had been his way round the problem. In C 2.2, the constraint in time was also raised by one respondent:

> I thought the curriculum was really too broad and beating about the bush... going the long way. So I decided...let me just go straight to the point, teach as much as I can. I had actually requested [the administration] to increase the number of contact hours for 1st year from 1 hour to 2 hours a day (head of ICT: C2.1-P6).

Aspects of the syllabus left out or not taught in these institutions included theory topics like *Historical Development of Computers* and *Classification of Computers*. One lecturer argued that he gave the students this content in another form because the theory topics did not motivate students like the practical sessions did. Despite the prominence assigned to ICT integration in the ICT Teaching Guide, this respondent considered it a theory topic and only allocated it an hour's lesson a day for each class.

The ICT lecturer at C 2.1 was of the opinion that the version of the syllabus had he had delivered to the student teachers indeed resulted in improved performance in the mid-course examinations. He indicated that in the year that he had used the existing schemes, the students scored poorly as opposed to the following year when he used the curriculum extract that focused more on the practical rather than the theory elements of the syllabus:

> We had about 100 students re-sitting the exams in that year. The following year the number of re-sits dropped to around 30 students. This year we have only 11 re-sits. The practical bit of the paper is actually the one that is pushing them towards the pass mark (head of ICT: C2.1-P6).

Responses obtained from the ICT lecturer at C 2.1 pointed to the fact that there was a risk of compromised standards of ICT training owing to inadequate supervision of the ICT department. He had largely worked alone and arbitrarily decided on what content to teach in the time available. None of his supervisors had raised any objections as to how he elected to teach ICT:

> Supervision is supposed to be carried out by the Dean of Curriculum's office and also the District Quality Assurance Office. I have been visited severally by the Quality Assurance people and so far they have no problem. They have inspected my schemes of work and found no problems with it (head of ICT: C2.1-P6).

One respondent pointed out that the PTE curriculum may have been developed by experts but it did not adequately address the needs of the prospective primary school teacher. The respondent suggested that the ICT syllabus for PTE had content that was similar to the Computer Studies syllabus for secondary schools and did not specifically aim at training teachers to use ICT in the classroom. He felt that the ICT syllabus needed to be made more relevant to teaching as the current syllabus was designed to teach people who can operate a computer, not teachers.

Since the ICT syllabus was not examined at national level, one respondent considered this 'an advantage' and came up with a set of ICT skills that he considered vital for a teacher to function in his profession. These skills were anchored in the syllabus, but they were not necessarily covered to the depth suggested in the syllabus:

> We have limitations and we have to work around these limitations. The biggest advantage we have is that the subject is still not examinable. If it was examinable, the pressure would be more. So right now I can say I would actually be happy if a pre-service teacher would walk out of this institution able to do some research on the net, type own mail, do some analysis using excel, set up a small database. Whatever else they need to learn they can learn out there. So the pressure of preparing students for exams is not there. So at the moment what I do is to make sure the

> students have interest in computers and that they are able to operate them (head of ICT: C2.1-P6).

Those interviewed in C 2.2 were also in agreement that the lack of a summative examination in ICT tended to negatively affect the way ICT was taught at the college, and to have a negative impact on the teachers' motivation towards using ICT. One respondent reported that the mid-course examinations determined what he taught the student teachers in the 1st year:

> I teach the theory part. I teach them because they are examined in the Mid course. Projects we don't give. We just give brief exercises. The only project that they do is the mid course projects (head of ICT: C2.2-P13).

ICT-subject integration

Responses obtained from those interviewed in both institutions indicated that the link between ICT and the rest of the subjects in the curriculum tended to be weak or simply non-existent. The ICT lecturer in C 2.1 did not see this link between the PTE curriculum and ICT, and it was his opinion that it is the teachers of the various subjects who should be responsible for teaching the pre-service teachers how to integrate ICT in their own subjects:

> They [curriculum developers] did not try to link this syllabus with the rest of the PTE curriculum. There should have been some kind of link between these two [elements of the curriculum]. Because when I come and check my syllabus, and it is telling me ICT integration and there is no link with these other subjects in the PTE curriculum, then it is difficult to implement it. The lecturers of various subjects should be the ones to teach ICT integration in their own subjects and then this ICT department only takes care of the technology aspect (head of ICT: C2.1-P6).

Other responses obtained also confirmed that ICT had not been mainstreamed in the curriculum in earnest and that this inhibited the ability of the lecturers to integrate ICT in their subjects. They also observed that besides lack of relevant content, the capacity of the lecturers to integrate ICT in their teaching had not been adequately developed:

> We have not introduced the use of ICT in our [English] syllabus as such... Using the computer, for instance, there needs to be certain programs which are relevant and some of these programs must be installed in the computer and of course you must also be trained so that you are conversant with these programs. Without that, it will be very hard to simply go to the computer and start teaching the students (lecturer of English: C2.1-P7).

The ICT lecturer in C 2.1 indicated that his role did not include that of co-ordinating ICT integration in the college as suggested in the ICT Teaching Guide:

> The syllabus basically requires me to teach ICT and there is only one topic on integration. So when it comes to [ICT] integration is when you find that you need to link ICT with the other subjects. All the other topics are just ICT. You don't even refer to any other area. Simply ICT, ICT, ICT (head of ICT: C2.1-P6).

One respondent in C 2.2 was not aware of any co-ordination roles being played by the ICT lecturers and attributed this to the unawareness of the college leadership of this expectation:

> No. That's not happening at all. Not at all. Because other departments are never involved in any training. So that policy maybe has not been interpreted or deployed. In fact most of the lecturers in the ICT department are new. So unless they are guided by maybe enlightening the managers on the other roles of the ICT lecturers, then it will not take off (CRE lecturer: C2.2-P14).

A number of respondents felt that there was need for sensitizing the ICT lecturers on this added role:

> The ICT lecturers should also be sensitised on their role other than teaching as perceived. That they have even a bigger role because of the new challenges (dean of curriculum: C2.2-P11).

Whereas the ICT Teaching Guide suggested that the ICT lecturer designs activities and projects that demonstrated integrated use of ICT in various subjects, the ICT lecturer at C 2.1 designed projects that demonstrated the students' ability in the ICT skills:

> I thought the project was supposed to evaluate if the students could practically use the [application] package, not to test ICT-pedagogy integration. That's what I got from the guide. So I prepare projects not just at the end of each [application] package but sometimes I give weekly and bi-weekly projects (head of ICT: C2.1-P6).

Responses from the lecturers interviewed suggested that they had expected that the intention of setting up the laboratory would have been to enable the installation of digital content for other subjects in the curriculum:

> I think the other option could have been to use it as ... a centre for other subjects ... I think there are other programs installed for various disciplines like the Social studies, English and other subjects and the students could easily get access to the centre or to the lab. But these programs are not there (head of LRC: C2.1-P5).

Some respondents interviewed in C 2.2 reported that 4 computers had been donated by the Strengthening of Mathematics and Science in Secondary Education project (SMASSE) programme for use in teaching Maths and the Sciences. However, these computers had hardly been used by the various lecturers in the Science and Mathematics Department:

> It's a challenge. They don't use them in classes. They have no time. They don't use them. The computers are few. Even me I don't use computers to teach my subject ...owing to a lot of work. I feel I have other responsibilities and it is difficult to allocate time for all these (science lecturer: C2.2-P15).

One respondent in C 2.2 observed that he had not used ICT to teach the sciences but felt that his ability to update his class teaching notes with information from the internet was a demonstration of his ICT skills:

> With all my knowledge in ICT, it still has not included the methodologies and pedagogies of teaching Science using ICT. But I have identified which areas in Science I can best teach with ICT. For instance I have just been basically enriching my notes through the Internet because I have a modem. I think it is working very well because I have my class notes updated. Very nice notes. That one I appreciate (head of ICT: C2.2-P13).

The respondent added that it was very demanding to prepare for ICT use in the classroom and therefore preferred to teach the traditional way:

> I use these notes in class to deliver my lesson. It has not changed the way I teach. ICT has made me a bit more resourceful...because if I were to use ICT in class, I would need more time for preparing and I do not have that time. The classroom setup is inhibiting because the classrooms are very small. Moving facility into this class or having a projector in class is very challenging. The room arrangement is very challenging. You reflect about

> that and you say 'Ugh! Let me go and teach.' The facilities have not been made appropriate for ICT integration in teaching (head of ICT: C2.2-P13).

The respondents suggested that absence of digital content made it difficult to use ICT in the teaching of other subjects. Lack of internet connectivity also compounded the problem and teachers accessed and distributed digital materials at their own cost:

> You see we do not have internet connectivity at the college so I download [digital content] when I access the Internet elsewhere because internet access here is zero. I bought a personal wireless USB modem and I also use it sometimes in the house. I download the material from UNESCO and Cyber teacher training centre. I then print and bind some of them and use for reference. I also have an interactive CD that teaches a student how to use the packages (head of ICT: C2.1-P6).
>
> The problem is that the programs per subject are not available as far as the use of computers is concerned; if these programs are available and the teachers are trained on how to use them, they will use them (lecturer of maths: C2.1-P8).

Owing to the lack of financial support from the college leadership, therefore, the lecturers downloaded digital material at their own cost and used these resources in teacher-centred ways.

Some respondents attributed the slow rate of progress in ICT-subject integration to lack of collaboration between the ICT department and the other subject departments. The head of ICT at C 2.1 understood his role as being limited to demonstrating to the rest of the lecturers use of ICT equipment or application:

> For effective integration to take place we need to liaise with the other departments. If any lecturer brings me an application or some digital equipment in his subject area, all I do is to demonstrate to him how the application or the equipment runs. So at least I give them that exposure (head of ICT: C2.1-P6).

Lecturers appeared unwilling to learn how to integrate ICT in their subjects and there was general disinterest among the staff. Added to this, was the usual resistance to change. A lecturer of English, which is a compulsory subject in the

curriculum, indicated that he had not used the computer at all or related resources to teach English at the college:

> ... we have not carried a computer to the classroom, or brought the class to the computer lab but I heard the Principal talk about that kind of programme. I think for future. That we will be able to use computers for teaching (lecturer of English: C2.1-P7).

Institutional and national ICT policies

A number of respondents interviewed in this Case were unaware of the existence of a national ICT policy. They indicated that there was no ICT policy at the institution and that decisions were arbitrary:

> There is no policy. Whatever happens happens. I request what I need. I am either given or denied. That's it (head of ICT: C2.1-P6).
>
> I have not seen the national ICT policy. I am not aware if it has been interpreted at institution level. Decisions are made locally about procurement and standards. There is no documentation guiding action (head of ICT: C2.2- P13).

One respondent said that he had read the KESSP paper and that the section dealing with ICT in teacher education was not elaborate. Another respondent also indicated that he had not seen any document that is specifically designed for ICT programmes in teacher training. He said that the college had not designed an institutional ICT policy or strategy. However the college had a Strategic Plan (2007 – 2012) where ICT issues were barely articulated and no clear targets were given for ICT use at the institution:

> The Strategic Plan endeavours to advance in ICT and integrate it into Teacher Education programmes. But there is little integration of ICT going on. There are no clear targets (dean of curriculum: C2.1-P4).

The responses from the lecturers suggested that they recognized the need for an ICT strategy that clearly states the targets to be achieved with ICT at the institution:

> When you don't lay down certain strategies then you almost aim at nothing. Therefore you might not be having certain programmes because you don't have an objective to achieve and when you come to ICT there are no set goals, maybe for the lecturers. Apart from being told that you should be computer literate there are no particular issues or areas that must be achieved by a certain time frame and that should be something to think about. The college could come up with, 'we want this department to achieve this and that, as far as ICT is concerned' then we will be moving in a certain direction (dean of curriculum: C2.1-P4).

In C 2.2, the respondents interviewed said that there was no formal ICT policy at the college and that there was a lot of activity around pre-service teacher training in the skills:

> In fact even after procuring some of the computers are still lying unused. In fact its just a few [lecturers] that ordinarily interact with us and so we have been able to install it for them, show them how to start typing. So there is need to train.... There is need of training. Even the support staff were never trained they just bumped into it. So when they have challenges we show them how to go round the challenges. (head of ICT: C2.2-P13).

7.3 CASE 3: Computers For Schools Kenya (CFSK) Programme

Background

Computers for Schools Kenya (CFSK) is a charitable non-governmental organization registered in Kenya under the Kenya Non-Governmental Organisations Co-ordination Act. Information on the CFSK website indicates that the organization was launched in Kenya in 2001, with support from Canada's International Development Research Centre (IDRC). The venture was modelled on a Canadian government initiative, Computers for Schools – Canada, that had placed refurbished computers in Canadian schools and libraries since 1993.

The organization set up its headquarters in Nairobi and established seven regional centres around the country. It embraced a partnership model that required partner schools to set up and furnish a room and pay a subsidised cost for the computers which were then delivered to the schools. In March 2003, CFSK delivered its first batch of 200 computers to partner schools and institutions. Since then it had, at the time of the study, placed close to 15,000 computers in more than 500 schools, community centres, and training institutes, reaching even into remote and sparsely populated areas of Kenya's semi-desert northern region.

CFSK's core activities included sourcing, deploying, and maintaining computers. However, it had progressively expanded its functions to supersede an ordinary recycling program, and grown to become a vital part of Kenya's efforts to boost ICT capacity and build a knowledge-rich society (CFSK, 2009). The organization had introduced a curriculum for training students in various schools to realise an ICT literate citizenry.

These activities were in tandem with government policy that had evolved at the time. The *Economic Recovery Strategy for Wealth and Employment Creation 2003 – 2007* recognized ICT as an important component of the country's education system. In an interview with one respondent (C4), he said that the organization had an ICT policy. However, he indicated that the policy did not exist as an independent document but was instead incorporated in the broad organizational mission:

> Yes, we have an ICT policy. But not as a separate document, but as part of our founding philosophy, as part of our strategic planning. Our primary objective is to take ICT beyond being an academic subject. In fact we look forward to a time when it will not be an academic subject but rather a tool that is applied right across the education enterprise; to facilitate greater access to education which ICT can do in amazing ways; to facilitate greater retention by making allowances for the very bright kids and the slow learners and all kids in between; to empower the teachers to deliver a lot more within the limited resources that are available; to professionalize the teacher beyond their training when they were in college because other than, in special cases, post service training or improvement is basically nonexistent in this country. So we would like ICT doing all that. But that is ultimately what we hope to do (director: C3-C4).

In-service teacher capacity building was therefore a core component of the CFSK mission. Another respondent suggested that the CFSK as a project had been inspired by dire need to initiate, spearhead and set the pace for ICT policy implementation in schools. The CFSK did not therefore wait for publication of government legislation on ICTs in education to get started:

> The people behind CFSK recognized the desperate need that was not being addressed [by the government]. There was a lot of talk happening and very little on the ground. So they took a leap of faith. They said 'let's get this started, other people can catch up with us as we move along, and we will make adjustments as we move along (deputy director: C3-C1).

As indicated in the CFSK website, the CFSK capacity development programme aimed at working closely with schools and educators:

> We strongly advocate for ICT literacy amongst educators so that they can transform and enrich pedagogy for the benefit of all students. Thus, the people in the education sector are our primary target clients. To facilitate

> the optimum use of the computers that we place, we have developed curricula for use in learning institutions, administer examinations and issue certificates to those that successfully undertake them. Digital multimedia content for secondary school subjects has been developed and is in use in a number of schools (CFSK , 2009) .

From the documentation available, it was evident that the following cadres of teachers had been variously trained in the CFSK teacher training programme.

- Teachers of all subjects to be ICT literate. An ICT-pedagogy component had been added as from 2006

- Teachers who would be able to teach the certified CFSK Computer Literacy course to all students in the partner schools

- Teachers who would be able to teach the subject Computer Studies that was based on the national curriculum

- Computer hardware maintenance training also formed a core component of the training programme.

The CFSK teacher education programme forms Case 3 of my study. The teacher training component of the CFSK initiative and related practices within the CFSK schools are examined. Data is drawn from an analysis of project documents and also interviews with stakeholders and teachers in the CFSK schools. The documents analysed include the teacher training curriculum and training materials, part of which can be found in Appendix 6.

Interviews were carried out with organizational leadership and programme administrators at the CFSK headquarters, stakeholders at the Kenya Institute of Education and officials at the Ministry of Education. Two CFSK partner schools were sampled for the study; C 3.1 and C 3.2, the latter of which also housed one

of the CFSK Regional Centres for Western Kenya. At each school, a total of 6 respondents were interviewed. These included the Principal of the institution, the Chairman of the Board of Governors, the ICT teacher, the Director of Studies and 2 teachers representing different subject groupings. At C 3.2, the Regional Centre Manager was also interviewed.

7.3.1 Programme level intentions and respondent perspectives

The CFSK's first teacher training programme was initiated in 2004. It targeted secondary school teachers with the initial aim of enabling the participating teachers to improve their computer literacy levels and be able to teach the CFSK Computer Literacy course to the youth in all the CFSK partner schools. This function was endorsed by a number of respondents:

> We are doing just basic computer literacy training for teachers, the reason being that the vast majority of our teachers do not even have that basic computer literacy to begin with (deputy director: C3-C1).
>
> We were trained on word processing and how to use the Internet. Mostly, basically typing and ... spreadsheets (principal: C3.1-C5).
>
> ... Initially we were trained to teach the students. But we were also to bring in the other members of staff. But we were not training them to ... train the students. We were equipping them with skills which they could also use in their daily teaching activities like preparation of the examinations and so on. Just using computers as teaching aids (director of studies: C3.2-C13).

Another respondent (C5) suggested that it was also meant to train those who could teach the subject Computer Studies, which was an elective subject in the curriculum. He said that during this period, no teachers for Computer Studies had been trained by the national teacher training institutions even though the subject was in the official national curriculum:

> We had one of our Computer Teachers trained by CFSK. So they normally organize training in August and we always sponsor our teachers. The training is specifically for the Computer [Studies] teacher. The school pays a subsidy for that (principal: C3.1-C5).

In the understanding of the CFSK leadership, the intentions of the teacher education programme subsequently expanded to include the function of enabling teachers to integrate ICT in their teaching, develop digital content for teacher education and classroom use and also develop the capacity of educational managers to manage the institutions more efficiently. In an interview with (C1), he outlined CFSK's role in teacher education as follows:

> ... we are doing training in integration of ICT in teaching and learning, so we are taking it one step up for those teachers who have already acquired computer literacy skills, now trying to give them skills on how they can apply that computer literacy in teaching and learning. The third thing we are doing is in digital content, digital multimedia content. We have developed a fair bit of content ourselves, but we are also in partnership with a couple of organizations that are involved in content development to facilitate the use of ICTs in teaching and learning. Then the final thing is directed more at the institutional administrators rather than the teachers per se, which is giving them the skills, ICT skills that would enhance their management of their own education enterprise (deputy director: C3-C1).

C5 gave a further definition of the intention of the CFSK as that of developing 'the teacher of the future':

> We would like to introduce the teacher of the future. The teacher of the future must be one who is a facilitator, not the fountain of all knowledge, which is what the traditional teacher is...I think it is time we moved away from pedagogy to...I think they call it andragogy...what they do with adult learners? ... That is the teacher of the future. So that's what we are looking at. A teacher who will go beyond transferring knowledge to facilitating exploration and acquisition of knowledge by the students and that is what the teacher of the future is about (director: C3-C4).

From the interviews with the respondents in the CFSK schools, these functions and intentions were not shared. The respondents understood CFSK's core intention as being focused on training both the students and the teachers on ICT literacy skills.

...The teacher was just supposed to see how best they could use the computer as a tool for teaching the students. So they were given very broad skills in the packages and I think it was left at that. When they started, there was that aspect of first training the teachers because when the teachers are trained then they will be used to train the students. So apart from the three teachers that pioneered, a number of teachers were trained by CFSK. Others went to Nairobi and they underwent training in, apart from the packages, hardware and maintenance...between 2004 – 2006 (regional centre manager: C3-C17).

...I may say it that it is insufficient because the training is only for the ICT teacher and the Principal. They should also give room for other teachers because they normally assume that the ICT teachers are the ones having knowledge about computers (principal: C3.1-C5).

Well from my experience, [a teacher who is skilled in ICT] will be equipped with the ability to handle a computer, using it for word processing, spreadsheets when it comes to processing of examinations. They are also equipped with the other packages as well. Database management and also PowerPoint for presentations. So its basically being equipped as a computer user. Two, the teachers are also supposed to handle breakdowns of computers in the lab. The teachers were supposed to be able to handle simple malfunction of the computer. And that is where the hardware training came in (head of ICT: C3.2-C14).

7.3.2 School level implementation

ICT Integration in the subjects

In common with the two Cases discussed previously, respondents observed that the computer laboratory set up by CFSK in the schools was meant specifically for the training of the students in ICT skills and not for training the teachers:

> The computer laboratory is for our students to be computer literate and IT competent (chairman board of governors: C3.1-C6).
>
> CFSK is offering [to the students] a computer literacy curriculum parallel to the KCSE [Computer Studies] curriculum. It is a bit different because it has 6 packages, Introduction, Word-processing, spreadsheets, Database, Internet and Programming (director of studies: C3.2-C13).

It was a common feeling among the respondents that the single laboratory provided by CFSK did not adequately meet their need to use the computers for teaching other subjects. One respondent indicated that CFSK did not allow computers to be removed from the computer laboratory. This limited the extent to which the teachers could experiment with a computer in the classroom:

> Normally they [CFSK management] just say the computers should be in the laboratory. They are not supposed to be removed. So the teachers are not able to apply some of the ideas that they may have on using computers in an under-resourced environment (principal: C3.1-C5).

Other respondents said that they would only access the computer lab when they were 'not busy' with the other subjects:

> The [disinterest] could have been brought about by lack of time. You know the computer requires a lot of practice but you see we are so busy. So that is why the gap has come about (principal: C3.2-C11).

Other responses suggest that the unavailability of an internet connection in school made it difficult for the teachers to teach using ICT. The Internet access option available in school was via a mobile phone which had very limited bandwidth and was therefore used for administrative purposes only:

> You know we cannot access a lot of information without internet...I even tried to use this Telkom line then I realized that it was not fast enough [for teaching purposes]. ...I believe for the time being we can just be using it in the office rather than using it for teaching as we think of getting a better connection (head of ICT: C3.2-C14).

One respondent (C1) suggested that the programme had progressed from offering basic ICT literacy to the teachers to preparing teachers who could integrate ICT in their subject areas. He attributed the move to demands from teachers whose expectations of the programme grew after the initial introduction:

> [A teacher] may be computer literate ... how does the teacher then use these skills to teach. I am sure at some point the Ministry will catch up because we are saying we have gone beyond [ICT] literacy. We introduced our own computer literacy programmes for teachers 5 years ago, and as soon as they are literate they are asking us 'What next? I am computer literate. Am I only going to use these skills to produce Report Forms or to maintain the attendance register, or to produce my notes?' (deputy director: C3-C1).

The difficulty in incorporating ICT in the subjects was blamed by some respondents on high staff turn-over. A number of teachers who had been trained on basic ICT skills had since been transferred to other schools.

> We are only 3 of us left out of about 15 that were initially trained by the CFSK. They have gone to non-CFSK schools. I think this affects how we implement ICT in this school (chemistry teacher: C3.1-C8).

The training model, as understood by some of the respondents, did not require that the trained teachers carry out school-based training for their colleagues. Teachers shared the knowledge they had gained on their own volition:

> But we were not training them to be able to train the students. We were equipping them with skills which they could also use in their daily teaching activities like preparation of the examinations and so on. Just using computers as teaching aids (director of studies: C3.2-C13)

Interviews with the CFSK leadership suggested that the CFSK had developed software for teaching but cited frustration from the government in approving the content for use in schools:

> We have developed content. We are hoping to do it as a pilot to show it can be done in the hope that the government will then run with it. Unfortunately, it is not taking off with the relevant government agency as quickly as it should. So we are trying to establish partnerships with other people who do this commercially (curriculum officer: C3-C3).

The respondents at C 3.2 indicated that that they had received the trial version of a Biology software developed by CFSK but support for this soon discontinued:

> CFSK did not develop that area very well. They started. I remember there is a time they gave us a sample of Biology document which they were working on. But they didn't complete. I don't know what happened. I think they stopped somewhere along the way. I am not very sure what happened. This being a regional centre we would be the first to have it if it was there (director of studies: C3.2-C13).

Those interviewed at C 3.2 observed that they had the motivation and skill to integrate ICT in the subjects but cited lack of relevant digital content as a main barrier. One respondent observed that this had diminished the enthusiasm for use of the computer that they had at the beginning of the programme:

> If we had the right software, the right digital content, then there would be nothing to stop the teachers from using computers to teach. Like in our school, the computers are there, students are there and teachers who have been sensitised on IT are there. So if the software was availed, then I don't see what would stop us. We would just integrate it as part of our lessons (regional centre manager: C3-C17).
>
> What I would say is that when we started off, we had very high ambitions that we were really intending to use computers as a teaching aid. But we experienced some problems and hitches along the way in terms of acquisition of software that could be used for teaching the students (head of ICT: 3.2-C14).

It emerged from the interviews with respondents from both schools that teachers and the heads of the institution had variously sourced software that they considered relevant to the teaching of various subjects:

> Apart from the Computer Studies as a subject, I urge the teachers to use the computers in developing their teaching materials. At times, we go an extra mile and buy for them some CDs containing programmes. We have tried. Like we have [content] for Geography, we have for Biology and then we also have the one for teaching English, analysing the set-books ...in the CD-ROMs (principal: C3.1-C5).

When the teachers were able to source for digital content on their own, some of the respondents interviewed observed that this content was used to further traditional teaching approaches rather than foster the innovative approaches to teaching that were envisaged by the top CFSK leader. Some respondents attributed this to inadequate training and indicated that they used the resources more effectively with the help of the Computer Studies teacher:

> The only problem is lack of training. Because at times we would buy the CD-ROMS and then they just operate them with the help of the Computer Teacher. So their work is lessened as they only take the students [to the laboratory] to watch [the CD-ROM] and then they explain... which is not very effective (principal: C3.2-C5).

Unlike the scenario described in Case 2, the other teachers in the staff at C 3.1 did not often seek the help of the Computer Studies teacher despite her willingness to help:

> I am just willing to do it. Only that they have not taken it [ICT] seriously. Because some of the teachers may be coming to train but they are not consistent, today he comes tomorrow not and if you ask they say that today I was busy and such kind of a thing (teacher computer studies: C3.1-C7).

Those interviewed, especially those who had been prepared by CFSK to train the students on ICT skills, tended to look at Computer Studies as an extra subject that did not form part of the official subjects that they were posted to teach. As a result, their engagement with the subject was temporary and presented challenges with the teaching load:

> Then I left the programme because we now had Computer Studies teachers coming in. Because you see the challenge was that alongside our regular teaching subjects, we were also supposed to teach Computer [Studies] on the side. So the teaching load was very high and we were not managing very well (teacher of English: C3.2-C16).

The respondents indicated that there had not been any face-to-face or ICT-based collaborative activities between their schools and the other CFSK partner schools:

> I would say that I have not been active when it comes to things to do with ICT... you see the network is not very good. We don't share. I am not even sure if they have ICT Clubs in their schools (kiswahili teacher: C3.1-C9).

In school management, the CFSK organizational leadership reported in the interviews that ICT was core in educational institutional management and that CFSK had trained the managers to carry out their responsibilities more efficiently using ICT.

A number of respondents suggested that computers were more actively used in the schools for administrative functions such as typing official letters, examinations and storing student data. In the understanding of one respondent, this was a demonstration that ICT had been integrated in the teaching at the school:

> There are some areas where they have refined those skills. For example in the preparation of examination. In our school, most teachers just type their own exams. They also use the computer to draw diagrams which previously had been very difficult to do free hand. As a result we produce very good quality of examinations. That is what I would say was integrated as part of the teaching learning experience (director of studies: C3.2-C13).

Institutional, organizational and national ICT policies

Interviews with the CFSK leadership suggested that the evolving national ICT policy had not directly influenced practice in teacher education in the country and that the awareness levels around ICT in education in Kenya had superseded government policy:

> Not in a formal, planned, predictable and measurable way. Sadly not. There is a general - maybe even 100% - awareness of the potential power of ICT to enhance all those educational fundamentals of access, retention, transition and the learning that occurs in between. Anybody involved in education enterprise seem to have a profound understanding that ICT would do a lot for him. But that awareness has not been adequately translated into implementable policy in my opinion (deputy director: C3-C1).

One respondent (C2) suggested that government policy on ICT in education did exist but was not influencing teaching in the schools. He felt that beyond policy

making at Ministry level, government had embarked on ICT equipment provision to schools in the country but noted that this would not change the way teaching and learning took place:

> The Ministry of Education has a framework. They have a policy paper and even the KESSP Framework identifies ICT as one of the investment areas. Sessional Paper No 1 of 2005 on a Policy Framework on Education, Training and Research dedicates an entire chapter to ICT. But all this seems to be happening at that policy level, Ministry level. It has not filtered into the classrooms as yet, as much as it should. The government has no doubt made enormous strides... I understand they have given computers to slightly over 200 schools in Kenya. But ICT in education goes well beyond infrastructure and computers. Computers are, in my opinion, the easier part of the puzzle. You still got to take care of maintenance. You've got to take care of content. You've got to take care of teacher training. You got to take care of just basic literacy before ICT can be applied (research monitoring and evaluation: C3-C2).

The respondents interviewed at the school level were not aware of the existence of any ICT policy documents at the school. One respondent however, deduced that the school policy would most likely draw from the CFSK organizational policy:

> If the school has a policy then it must be connected to the CFSK's policy because they are working together. The CFSK and the school policy must be one (kiswahili teacher: C3.1-C9).

Another respondent (C15) indicated that the school ICT policy was understood rather than written and was focused on equipping the students with the basic ICT skills by the time they finish their secondary education:

> Our ICT policy is not written down but generally what we have is that all our students by the time they leave the school they are supposed to be equipped with ICT skills and towards that end we are trying to go through the CFSK curriculum. So the CFSK computer curriculum is compulsory at the school. So if you are talking about policy in that sense, then that is what we do. It is unwritten (teacher of computer studies: C3.2-C15).

He also observed that there were also unwritten policies around expectations on the teachers with regards to ICT, and added that these were not binding:

> For the teachers it is open ended in the sense that depending on your work load and things like that and your interest also, you are supposed to use the computer to prepare for your lessons, prepare for the examinations,

analyse the examinations [results]. So it is to the advantage of the teacher to be equipped with these skills. But it is not compulsory that a teacher has to do that. It comes out of interest. If you find that the computer makes your work easier, then you integrate it and I think quite a number of us have succeeded in doing that. We have actually embraced the computer. We use it as a tool to facilitate our work as teachers (director of studies: C3.2-C13).

7.4 Conclusion

The key points arising from this section include:

- Teachers generally had restricted access to computers since in all three Cases, the few computers available were set up in a computer laboratory. It was therefore very difficult for teachers of other subjects to utilise this facility for regular subject teaching. The emergent practices with technology therefore broadly displayed Type I implementation of ICT Tubin, 2006), where teachers used technology to reinforce rather than change the traditional routines in schools.

- In some of the institutions visited, there was evidence of pedagogic practice with ICT , even though a national ICT policy spelling out the role of ICT in education, was published much later. This is evidence of influences from other places, especially those projects that had links with organisations that had international reach. Traditional teacher-centred approaches to teaching were prevalent in all three cases in spite of the availability of the requisite computer infrastructure and a supported teacher training programme. This seems to agree with Cuban (1993) who observes that teachers practices with ICT seem to preserve old practices rather than promote new approaches to teaching.

- There is a general unawareness of the existence of national ICT policies. This is significant for this thesis since it provides the ground for further investigation on the influences on institutional practice with ICT, other than national policy. In all three Cases, there is evidence of influence by the international organisations, regional influences like the NEPAD project and national institutions like KIE. This is significant for this study as it provides a further step in working out a framework for analysis of the sites of policy development of relevance to ICT in teacher education, and examining the interrelations between these tiers.

CHAPTER EIGHT: ANALYSIS AND DISCUSSION

Introduction

In this chapter, I address the main research question of the study:

To what extent have national ICT policies influenced policy and practice in teacher education in Kenya?

To answer this question and in line with the research sub-questions, I begin by analysing how national ICT policies relevant to education have evolved since independence in 1963 and some of the characteristics of these policies. I outline specific ICT policies and practises in teacher education programmes in Kenya and examine possible influences in the period between 1997 and 2007, besides national ICT policy. I draw from the data obtained from documentary analysis, interviews with key stakeholders and the 3 case studies.

In many ways, the data that I have collected is comparable to the kind of data that could be collected in any international study dealing with ICT policies in education. However, there are dimensions to my data, which I describe a little later, that illustrate the particularly African context from where this material has been obtained. It was clear while collecting the data that to understand the specific issues associated with teacher education in Kenya, I needed to explore some of the history of the development of broader national ICT policy. Therefore, although some of the policy statements and documents I refer to do not specifically mention teachers, I needed to explain and analyse these in order to understand the background on which some ICT policy initiatives in teacher education in the subsequent period were grounded.

One of the things that was apparent as I collected the data was the manner in which ICT policies originated at different levels in the policy making environment. This included: international policy; regional policy; and more recently, the role of national and even institutional policy. I propose a 4-Tier framework to analysis the influences and activities at these sites, illustrated in Figure 9 below.

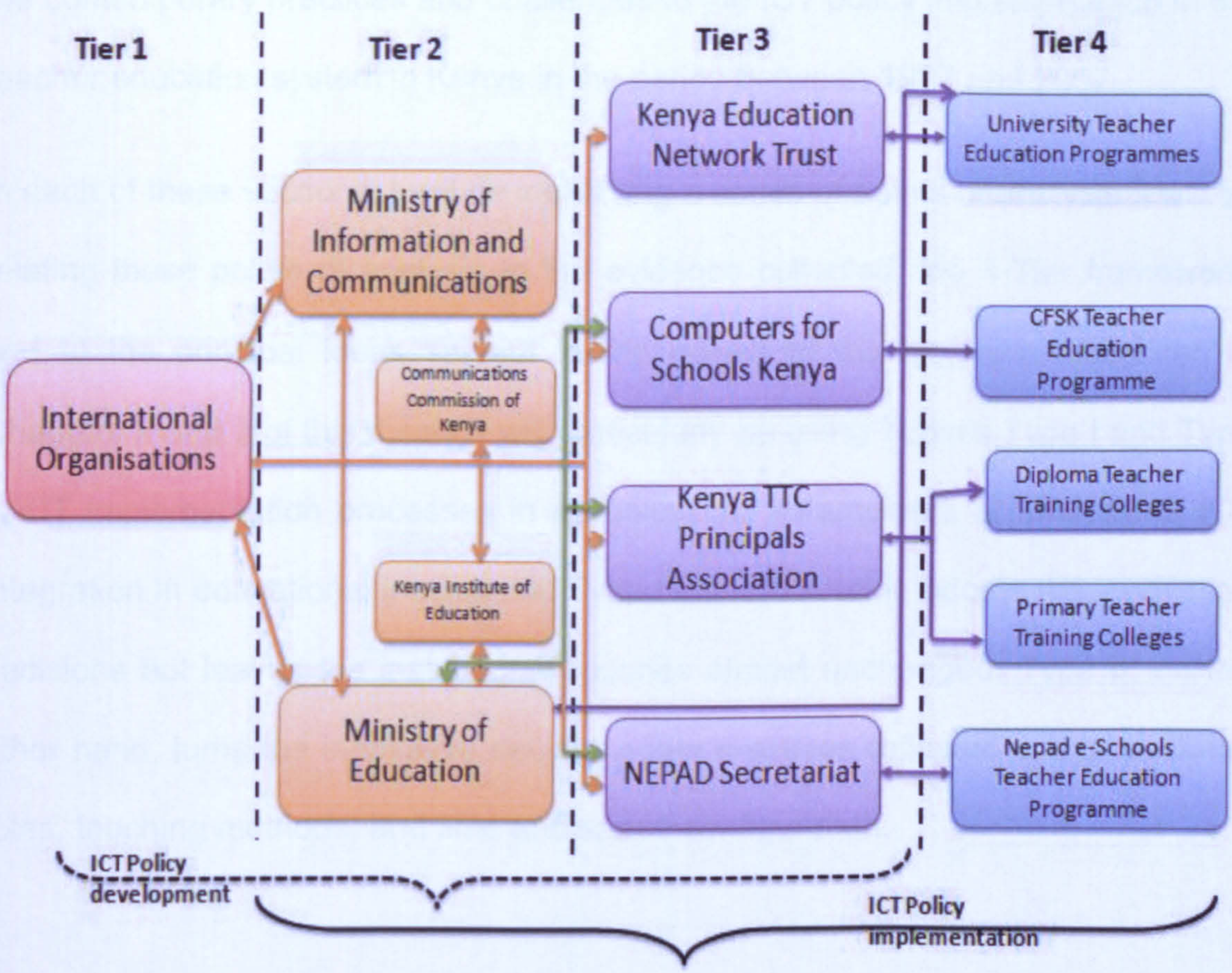

Figure 9: The 4-tier ICT policy development and implementation framework in teacher education in Kenya

The framework categorises and discusses international organisations at Tier 1; various Ministries and related bodies at Tier 2; private or public sector organisations and organisational secretariat at Tier 3; and the teacher education programmes at Tier 4. In this chapter therefore, I discuss evidence from the study that illustrate the dynamics within and tensions between these four Tiers, in

relation to the ICT policy and practices in teacher education programmes in Kenya.

I will be using this 4-Tier framework as I examine in Section 8.1, the 3-phase origin of ICT policies and their influences on policy and practice in teacher education in Kenya (drawing evidence from Chapter 5). In Section 8.2, I discuss in some detail the contemporary practices and challenges to the ICT policy implementation in the teacher education system in Kenya in the period between 1997 and 2007.

In each of these sections, I will be identifying a series of points of analysis. I will be relating these points of analysis to the evidence collected, the 4-Tier framework, and to the principal ideas set out in the review of the literature discussed in Chapters 2 and 3 of this thesis. I will particularly be using Tubin's Type I and Type II ICT implementation processes in schooling as a framework of analysis of ICT integration in educational institutions. Type I implementation adopts the innovation decisions but leaves the institutional routines almost unchanged. Type II, on the other hand, turns the innovative decisions into practices reflected in the teachers' roles, teaching methods, and time and space configuration.

8.1 Origins of ICT policy in teacher education in Kenya

8.1.1 The Pre 1989 Phase

One of the earliest policy initiatives and documents whose provisions may have been of relevance to the use of technologies in education was the Kenya Broadcasting Corporation Act (KBC Act) enacted at independence on 1st July, 1964. This nationalized KBC and changed its name to Voice of Kenya (VOK) (Republic of Kenya, 1964b). With this Act, the status of the VOK changed to that of a public service broadcasting organization, which fell directly under the Ministry of Information and Broadcasting. It is significant that it is in this same year that school broadcasts for primary schools were initiated and broadcast through the VOK. School radio broadcasts was one of the earliest examples of the active and direct involvement of the Ministry of Information and Broadcasting in the instructional process in educational institutions.

The government's commitment to developing an education system that would fit with the emerging national goals of the post independence Kenya, as outlined in Sessional Paper No 10 of 1965, did set the stage for the use of various technologies in education 'to fight ignorance, poverty and disease' (Republic of Kenya, 1965: p1). The recommendation for use of radio and correspondence education by the Ministry of Education specifically for teachers was made by the Kenya Education Commission of 1967, otherwise known as the Ominde Commission, and this, therefore, seemed to set the stage for the role that the VOK would play in the design of instructional radio in the subsequent years.

A recommendation by the Ominde Commission that seemed to be a response to the proposition in the Sessional Paper No 10 of 1965, outlined the role of qualified teachers in the post independence context:

> At this stage of Kenya's development, education is much more an economic than a social service. It is our principal means of relieving the shortage of domestic skilled manpower and equalising economic opportunities among all citizens. For that reason, it is of utmost importance that ...supply of teachers and curricula should be required to meet government specified standards (Republic of Kenya, 1965: p40).

The Ominde Report aimed at increasing literacy through the radio technology that would support flexible home-study for teachers. This policy recommendation also acknowledged the fact that radios were already a common technology in homes and schools in Kenya in the immediate post independence Kenya.

The establishment of the Correspondence Course Unit at the University of Nairobi in 1967, the legitimisation of the Kenya Institute of Education in 1968 in the Education Act Cap 211 of 1968 and the subsequent partnership between these two institutions in 1969, seemed to be a significant step in laying the structures for the first national in-service teacher education programme that would put to extensive use the radio technology for in service teacher training (See: Chapter 5, Section 5.1). This marked the first phase of in-service teacher education programmes and was an early example of a cross-tier partnership that acknowledged the significance of the university, a Tier 4 institution in deploying teacher development programmes in other institutions in the same Tier.

Up to this date, the policy initiatives and documents originating both from the Ministry of Information and Broadcasting and the Ministry of Education, had placed the responsibility to develop radio broadcasts for schools and teacher development programmes on the Ministry of Information and Broadcasting. This

was a significant development; the School Broadcasting Division of the KIE remained attached and housed at the VOK department of the Ministry of Information and Broadcasting. It is therefore noteworthy that the emergent communication technology of school radio had been claimed as a policy area by the Information and Broadcasting ministry. This would have subsequent impact on policy development and implementation around ICT and education both during this period and in the subsequent period. While the Ministry of Information and Broadcasting would play a role in development of ICT policy in education, the focus would remain on ICT infrastructure and access provision, which was within its main mandate.

The redefining of role of the Kenya Institute of Education and the movement of the School Broadcasting Division from the VOK where it had been attached, led to the establishment of a new division called the Education Media Service (EMS) through Legal Notice Number 105 of 1976. This move by the government seemed to mark another turning point; the production of multimedia teaching and learning resources now became a core responsibility of the Ministry of Education rather than the Ministry of Information and Broadcasting. The site for this aspect of ICT policy development and implementation for technology in education had therefore moved from the Ministry of Information and Broadcasting to the Ministry of Education, marking a significant shift in policy responsibility among these Tier 2 institutions in a way that would influence the way instructional technologies would be implemented in the education sector.

The ICT policy activities in the Telecommunications, Information and Broadcasting sectors around this period intensified with the collapse of the East African Community in 1977, culminating in the enactment of the Kenya Posts and

Telecommunications (KPTC) Act of 1977, and the Science and Technology Act of 1977 that established the National Science and Technology Council (See: Chapter 5). The KPTC Act made no mention of activities in the education sector at all and the NSTC seemed to be focused on its role as an advisory body to government on 'science education'.

But crucially, the Council was based at the Ministry of Research, Technical Training and Technology, and not the Ministry of Education. Up to this point therefore, ICT policies that were likely to influence education and education technologies continued to be formulated at Tier 2 sites, but mainly outside the Ministry of Education. The sites of policy development of relevance to education span across different ministries at Tier 2, leading to fragmentation and lack of coordination in the policy development process – a crucial factor in their influence. For example the increased policy activity in the Telecommunications, Information and Broadcasting ministries did not mark any significant influence on activities in the education sector during this period.

By the close of this decade, more activities focusing on the radio as an educational tool continued to emerge in Kenya. Funded by USAID, the Radio Language Arts Project (RLAP) initiated in 1980 was part of a movement in a number of developing countries at the time; International Organisations like USAID launched and supported educational assistance programmes intended to address challenges in educational infrastructure, schools, teacher training, materials and administration. These challenges were further compounded by rapid population growth. The radio was an ideal first choice technology; broadcasting costs at the time were relatively low making it highly cost effective in reaching large numbers of teachers at the same time.

The government declaration of Free Primary Education in upper primary classes in 1982, which in itself was a response to the challenge of rapid population growth at the time, created the need to employ more untrained teachers in primary schools, as outlined in Figure 3 in Chapter 1. At a time when the total output of all teacher training colleges in Kenya was 6,000, the government found it necessary to employ 40,000 untrained teachers to bridge the teacher shortfall. The initiative by the University of Nairobi, in partnership with the Ministry of Education, to launch a second phase of the in-service teacher education programme in response to this challenge also employed radio technology, alongside print, audio cassettes and face-to-face interaction.

The policy decision to use technology in in-service teacher education was therefore influenced by a development challenge elsewhere – low literacy levels among a rapidly expanding population - that called for training of a large number of teachers at a relatively low cost. During this period advances elsewhere in the world were strongly influential in Kenya. Some of the Special Interest Groups that emerged in Europe focused their attention on the potential of ICTs for literature search, information storage and retrieval. Kenyan professionals in the education field, including librarians, responded to these global trends.

These international influences were also the force behind the establishment of LRCs by the Ministry of Education in PTTCs in the 1980s, which marked the beginning of resource-based learning in primary teacher education institutions (Weunda, 2005). These World Bank supported LRCs offered audio resources and audio visual equipment. This model of technologies located in a separate isolated building in what looked like a 'technology hub' would later impact on the implementation of ICT curriculum in the primary PTTCs.

In this period a majority of policy formulation activities were concentrated at Tiers 1 and 2 ; ICT policy focussed on the telecommunications, information and communications sector. The policy statements that originated from the Ministry of Education together with related policy initiatives in other Tier 2 ministries focused on radio as the preferred educational technology. The core responsibility for developing the lessons for instructional radio lay with the KIE, with broadcasting remaining the responsibility of the Ministry of Information and Broadcasting. The enactment of the Kenya Broadcasting Corporation Act (1988) re-affirmed the place of radio in society in general and in education in particular. The Act stated that the Corporation would provide independent and impartial broadcasting services of information, education and entertainment (Republic of Kenya, 1988). The innovations in teacher education that were possible with the radio were typically Type I (Tubin, 2006) and did not point to any significant change in the teacher's role in school.

8.1.2 The 1990 - 1999 phase

The 1990's was a decade marked by corruption, inefficiency and dictatorial tendencies in Kenya (Bowman, 2010; Waema, 2005; Etta, 2005), and this had an impact on the way policies were developed and implemented not only in the education sector but in all other sectors. Ross (1992) observes:

> By the early 1990s, the independence of the judiciary was impaired, the operation of Non Governmental Organisations restricted, the secret ballot tampered with, the candidates' freedom to campaign curtailed. By 1991, corruption had accelerated and the rule of law had corroded, tarnishing Kenya's reputation as a politically stable democratic polity (p92).

In the education sector, the government made efforts to implement the goals of the Jomtien 1990 World Conference on Education For All (EFA). However, the 1990s were marked with economic hardships owing to the implementation of the

Structural Adjustment Programmes (SAPs) imposed by the World Bank and the IMF to ensure debt repayment and economic restructuring not only in Kenya but also in a number of other developing countries (See: Chapter 5). This period was characterized by poor economic growth in Kenya.

ICTs were perceived by government stakeholders as key in promoting the very much desired economic growth. This lead to momentum in the process of developing a national ICT policy process and publication of the first Draft National Informatics Policy in Kenya in 1993 by NCST. This step was considered by some as an influence by the increasing availability of computers in the education sector (C1), as well as a response to UNESCO's bid to popularize Information Technology in member countries at the time through its Intergovernmental Informatics Programme (IIP) (Ochuodho and Matunga, 2005; Waema, 2005). The first view exemplifies a bottom-up ICT policy development context (Elmore, 1979; Ball, 1997) ; the availability of computer equipment in Tier 4 organizations drives ICT policy making efforts at Tier 2. The latter interpretation illustrates the role that Tier 1 organizations would play in efforts to formulate national ICT policies, not only in Kenya but also other countries in Africa in the subsequent years.

The COMESA also identified the need to harness information technology for development around this time, a position supported by United Nations Economic Commission (UNECA) in 1995 (APC, 2003). Other regional influences on ICT policy development at the time included the formation of the African Information Society Initiative (AISI), whose mandate was to spearhead the elaboration and implementation of national ICT plans, promotion of connectivity and ICT development in African countries (Etta, 2005)., During this period ICT policy

development activities continued to be concentrated at Tiers 1 and 2 but with some emerging influence from Tier 4.

The Ministry of Research, Technical Training and Technology, under which the NCST fell, continued to make attempts towards the development of the *National ICT policy* in the early 1990s (See: Waema, 2005; Ochuodho and Matunga, 2005; Bowman, 2010). The draft that had been prepared in 1993 had not progressed through the legislation process and was followed by a number of other unsuccessful drafts. Each draft was successively seen to be deficient in its focus (Waema, 2005). In a period characterized by political repression, these failures were therefore hardly surprising. The discontinuation of the schools radio broadcast programme for pupils in 1995 by the Kenya Broadcasting Corporation owing to soaring bills, for instance, demonstrated the wider inefficacy that prevailed in government at the time. The general incapacity by government to accomplish any technology in education policy initiatives in the early 1990s can be seen to have been part of wider systemic failures witnessed in the country at the time.

The introduction of Computer Studies as an elective subject in the secondary school curriculum in 1996, which was a result of influence by similar developments elsewhere in the world at the time, marked a high point in the policy development arena for ICTs in education during this period. The syllabus aimed at fostering basic computer skills in the learner. But there were no trained teachers of the subject at the time. This policy initiative at Tier 2 would lead to the introduction of Computer Studies as a teaching subject in DTTCs and universities 5 years later; an example of a Tier 4 ICT policy response to gaps and needs created by policies made in Tier 2.

This development was unusual during this period when the focus for ICT policy development remained on the information and broadcasting sector, as had been witnessed in the previous phase for example the enactment of the Communications Act in 1998. The establishment of the Communications Commission of Kenya (CCK) by this Act of Parliament, however, meant that there was now in place a legally constituted body through which cross-sector collaborations between the telecommunications and education sectors became possible.

Reforms proposed by this Act located the CCK within the Ministry of Information, a move that seemed to determine that the policy activity that would influence the ICT in education sector would remain within the confines of the Ministry of Information, just as had been the case in the previous phase. It is significant, however, that it remained within the mandate of CCK to ensure improved ICT access in the education sector, in partnership with the Kenya Education Network (KENET). The support offered by KENET to higher and tertiary education institutions at the time focused on provision of internet connectivity, as did other initiatives in the subsequent phase.

My analysis of documentary evidence suggested that towards the close of the millennium, the education and the ICT sectors were separately going through radical changes. ICT Policy development activities that were of relevance to the education sector remained more intense within Tier 2 ministries and departments that had a responsibility towards telecommunications and the broadcasting sector rather than education. Overlapping mandates came in the way of the realisation of a National ICT Policy. Departments like the NCST had been established as part of a Ministry that did not have the development of policies for and around education

technology as one of its main briefs. Other than the facilitation of internet connectivity among higher education and tertiary institutions by CCK in collaboration with KENET, very little progress was made in much of the 1990's towards national ICT policy development that was of direct significance to education.

A number of policy statements developed towards the end of the decade set the pace for innovative approaches to curriculum development and delivery, and also teacher education in the subsequent years. One of the recommendations was that the government should re-launch the educational broadcasting services discontinued in 1995. Of significance to this study was the recognition by the Koech Report of 1999 of the need for cross-sector collaboration between the Education and the Information and Broadcasting sectors in the realization of specific and deliberate educational goals that would benefit teachers. This demonstrated the inter-tier interfacing that was required to realise the goals of education through technology.

Other policy proposals that would later have a direct bearing on ICT in teacher education appeared in these policy documents, and made particular reference to flexible and distance learning. Whereas the *National Poverty Eradication Plan 1999-2015* did not make explicit mention of ICTs in education and training, it did set the stage for the varied interventions of relevance to teachers at the turn of the millennium, as discussed in Chapter 5.

8.1.3 Post-1999 Phase

The year 2000 marked heightened attention on ICT policy development for education in Kenya . Evidence from the documentary analysis suggested that policy documents with a bearing on technologies in education in general, and teacher education in particular, were on the increase in this phase, building on from the policy documents published in the late 1990s.

Efforts towards the realization of a national ICT policy also intensified, with more involvement by the private sector, civil society, international bodies like the IDRC and other ICT policy champions within government; such as the Permanent Secretary (PS) in the Ministry of Research, Technical Training and Technology (MRTTT). This aimed to develop national policy guidelines that would steer the development of ICTs in the country to address the disorder created by the 'fast and haphazard growth of information technology that lacked direction and regulation' (Waema, 2005: p25).

Tier 1 international influences (Figure 9) on general ICT policy making at the beginning of the millennium focused on ways to attain improved economies in developing countries. The World Bank initiated Poverty Reduction Strategy Papers (PRSP), the UN Millennium Declaration, and the Dakar Framework for Action on Education for All, all formed the basis for ICT policy making in Kenya at the time (Nyong'o, 2005). They also influenced the formulation of education policies in the Post-1999 era that focused on the ICTs, particularly computers and the Internet as key drivers to improved economies.

When a new government was elected in 2002, further impetus was given to the ICT policy development process as documented in Chapter 5. Several initiatives aimed at expanding the use of computers by students and teachers in educational

institutions began to emerge in this period. The establishment of the CFSK, a Non Governmental Organisation (NGO) in the year 2001,for instance, with the core mandate to provide computers to schools and train teachers and students on ICT skills, was a response to the government initiative that introduced Computer Studies in secondary schools 5 years earlier (data sources C1 and C3). Whereas its core focus was provision of computers to schools as its name aptly indicated, the organization worked through a partnership model with selected schools to build the capacity of specific teachers in their partner secondary schools to teach the newly introduced subject Computer Studies as well as the CFSK Computer Proficiency curriculum.

This initiative was significant in two ways; first, it not only exemplified the prioritization of ICT infrastructure provision in education by a Tier 3 organization, but it also demonstrated early understandings of the need to train teachers on ICT skills for purposes of accomplishing national curriculum requirements. It was not only an apt example of a response by a Tier 3 organization to needs and gaps created by a policy decision at Tier 2 to introduce Computer Studies as a subject in secondary schools, but also a demonstration of a variation of Type I implementation where the ICT infrastructure would potentially encourage very simple practices with ICT, like using the computer facilities for entry of student data or typing of examinations. Second, it is noteworthy that CFSK was in itself modelled around CFSK Canada, further demonstrating Tier 1 influences on the local context.

The years 2002 to 2007 marked a period of intense ICT policy making, especially after the election of a new government in the year 2002. This was 'the high-water mark of ICT policy making in Kenya' (Bowman, 2010: p89). The government,

through the Ministry of Education, continued to play a key role in initiating ICT programmes in teacher education, especially primary teacher education, at a time when the national ICT policy was still evolving. As seen in the CFSK initiative and the government's provision of funds to equip all the TTCs with computer labs, with 30 computers each, demonstrated that ICT infrastructure was still the priority for government at the time, relative to other elements in ICT in education like the curriculum and teacher education.

A number of colleges developed in-house curricula, which focused on the basic ICT skills. This was long before a national ICT curriculum had been developed. Such a response by the colleges was influenced by market forces. Owing to the prevailing understanding of ICT as 'a separate skills set' that was a key demand of the job market but had yet to be formally included in the PTE curriculum, it is not surprising that student teachers in most colleges continued to be charged an extra levy for taking the ICT Skills course. The ICT fee continued to be an 'extra levy' even when ICT had formally been incorporated as a teaching subject in the Primary Teacher Education (PTE) curriculum (P2).

The intention to 'streamline' IT Studies in the curriculum as stated in the ERS published in 2003 informed ICT policy intentions expressed in subsequent policy statements and initiatives that tried to interpret and implement this policy strategy in education and training. For example the E-Government Strategy published in 2004 proposed the inclusion of ICT skills training for all government personnel. All training programmes undertaken by government personnel would have 'an IT component in order to ensure a continued pool of IT knowledge base within government' (Republic of Kenya, 2004: p21).

The ICT Scoping Study which was integral to the implementation of the School Empowerment Programme (SEP), not only marked an acknowledgement by the Ministry of Education that there was need for a context sensitive approach to professional teacher development, but also reaffirmed the necessity for ICT based training solutions for teacher professional development. It therefore exemplified a very deliberate attempt by a Tier 2 body to anticipate the likely implementation hurdles that the ICT policies for teacher development might face at Tier 4.

Whilst commissioning of this study was one of the earliest indications of the appreciation by government of ICT as a pedagogic tool in teacher development, the primary object of this particular study revolved around access to ICT infrastructure by teachers. This biased the report as an 'infrastructure report' in the first instance. The focus on ICT infrastructure as a key policy area in education and training therefore persisted with the publication of this report. As discussed in Chapter 5, the study report had a direct influence on the subsequent policy initiatives.

In the same year, the official introduction of ICT skills training in the PTE curriculum was done through a national syllabus for all the 21 public primary TTCs published by the Teacher Education Division of the KIE. The challenge of implementing this curriculum was the absence of teacher educators who were trained in the requisite ICT skills. Following the example of some secondary schools, a number of colleges employed IT technicians or other IT professionals who were not trained teachers or teacher educators to teach ICT skills to the pre-service teachers. This tendency to engage IT technicians (non-teachers) to deliver ICT courses to pre-service teachers might explain the persistent focus by the ICT

departments in TTCs on teaching ICT skills, even when sections of the syllabus had been revised to include aspects of ICT integration in education.

The attempt to define the role of ICT in education in general and in teacher education in particular continued to gain attention in the policy documents that were evolving around this time. The *Sessional Paper No 1 of 2005 on A Policy Framework for Education and Training*, on which a number of policy documents would subsequently be anchored, recognized both the significance of ICT skills for the citizens of Kenya and the value of ICT as a tool for pedagogy in education and training. The use of ICT as a classroom tool had finally been acknowledged in a national policy document that would influence subsequent policy documents and initiatives.

This sessional paper indicated the government's intention to promote expanded use of ICT as a tool for effective management, research and development at all educational levels, and also use of the internet for education, training and research. This policy document also re-affirmed the intention of government to provide teachers and education sector managers with access to information and tools 'to enable them to better deliver educational services' (Republic of Kenya, 2005a; p83), which was a further hint not only at a focus on infrastructure provision but also the catalytic and transformative role that computers were expected to play in the education sector (Hawkridge et al, 1990).

The publication of a teaching guide for the primary ICT PTE curriculum in 2005, with an additional topic 'ICT integration in Education' where concepts on ICT integration in education were covered was a response to the provisions of the

Sessional Paper No 1 of 2005[8] on A Policy Framework of Education and Training. This was as a significant break with tradition as teaching guides ordinarily carried content that were a mirror reflection of the syllabus document, and would give teaching tips and resource suggestions to the teacher educator (K3). The need to add this section to the syllabus was a compromise scenario (See: Chapter 5).

Whereas this move might also be seen to have been a response to the ERS policy of 2003 that called for the streamlining of ICTs in education, it can also be attributed to an emerging awareness by the staff in the Teacher Education division at KIE on the need for a teacher preparation system that would develop teachers who appreciated the role of ICT as a pedagogic tool in all subject areas, what would be referred to in subsequent policy documents as 'ICT integration':

> We realised that teachers needed to not only have the basic ICT skills but also the ICT integration skills that would enable them to use ICT to effectively teach their various subject content areas (K5).

Furthermore, the effort by the teacher education division at KIE to expand the stakeholder base for the PTE ICT Panel to include staff from the Flemish Development Organization (VVOB), who were already undertaking ICT integration in education projects in collaboration with some teacher education institutions like the KTTC, can be seen to have influenced the content of the ICT syllabus for primary teacher education, typifying how a Tier 1 organization directly determined ICT policies at Tier 2 at the time (See: Chapter 5). Other stakeholders in teacher education institutions at Tier 4, who had previous experience with ICT in education assignments were invited to the ICT for PTE panel, having been nominated by the college Principals.

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[8] ICT Policy documents in Kenya often circulate among interested stakeholders in draft form, either officially or unofficially, hence the many policy documents that were published in 2005 and yet are supposedly anchored on the Sessional Paper No1 of 2005.

I was assigned to co-author the ICT and pedagogy section of the Teaching Guide, together with the representative from VVOB. My own views had been shaped largely by both experiences and knowledge of developments in ICTs and pedagogy that were going on in the international field, and by my own experience as a teacher educator in a TTC in Kenya. My involvement with Tier 1 institutions and my job in a Tier 4 teacher education, had given me the experience in potential classroom use of ICT, to significantly influence ICT policy for teacher education at Tier 2. There was a paradigm shift from ICT skills to a focus on policies that encouraged ICT-pedagogy integration in the PTE during this period. The manner in which players in teacher education institutions attempted to operationalise this shift in actual practice and the challenges this presented are discussed in sub-section 8.2.

The launch of the NEPAD e-schools project in Kenya in 2005 exemplified and at the same time influenced this paradigm shift. As with previous policy efforts, the prioritization of computer infrastructure to schools and internet connectivity provision for schools was also true of NEPAD. But as documented in Chapter 7, the curriculum for the NEPAD e-schools teacher education programme did not entirely focus on the ICT skills but instead aimed at building the teachers' capacity to deliver an integrated ICT curriculum in the context of their own subjects:

> To provide teachers with ICT skills to enable them to use ICT as tools to enhance teaching and learning, create a critical mass of trained teachers in ICT in every school, and to integrate ICT in teaching and learning (NEPAD, 2006)

An approach had therefore emerged where a teacher development curriculum included ICT-pedagogy integration rather than basic ICT skills. The emergent tensions and challenges are documented in Section 8.2 of this Chapter.

This renewed focus on ICT integration in education in the policy documents also explains the emergence of a series of initiatives by the Ministry of Education that culminated in the publication of the *ICT in Education Options Paper*, where proposals were made on ways in which the Ministry of Education could integrate ICTs across the education sector. This was a Tier 2 initiative supported by USAID who seemed to have augmented this change of focus. It fitted within the local national policy context at the time, and continued to influence subsequent policy activity at Tier 2 within the Ministry of Education. The subsequent drafts of the *ICT Strategy for Education and Training*, for instance, drew heavily from the *ICT in Education Options Paper*, especially by way of identifying the 'strategic pillars' that would ensure the effective deployment of ICTs to improve access, quality and equity in the delivery of education and training in Kenya. Of relevance to teacher education were the following priority areas:

> ...digital equipment, connectivity and network infrastructure, harnessing emerging technologies, digital content development, integration of ICTs in education, training and capacity building(including professional development) and research and development (MoEST, 2005a: p vii).

These pillars also formed the themes around which sections of the subsequent ICT policies in education would revolve.

It became increasingly evident that the ICT policies that were evolving in the education sector were anchored more and more in the policies and documents that had been published in the immediate preceding past, unlike the random ICT-related statements spread across different documents witnessed in the earlier stages.

My analysis shows that the theme of teacher education and ICT integration in the curriculum continued to gain strength in the subsequent policy documents. Policy

statements emerging during this period signalled that policy makers at the Ministry level were aiming at a tridimensional understanding of the role of ICT in teacher education; the need for basic ICT literacy skills for teachers, capacity of teachers to teach ICT as a subject and capacity of teachers to integrate ICT in their daily classroom teaching. The attempts to interpret this tri-dimensional understanding of the role of ICT in teacher education at Tier 2 seemed to manifest itself in the varied understandings of the role of ICT in teacher education evidenced in Tier 4. These are discussed in the subsequent sub-section.

By the time the Draft National ICT Policy was published in 2006, ICT was considered a tool that could enable the country to attain swift and sustainable economic growth, reduce poverty and stimulate investment and innovation in ICT (Republic of Kenya, 2006a: piv). The *Draft National ICT Policy* was an initiative of the Ministry of Information and Broadcasting during this period, having been variously spearheaded by the other Ministries previously (See: Waema, 2005). It is noteworthy that the themes in this national ICT policy document related to education incorporated the pillars that had been successively developed by the Ministry of Education in the *ICT in Education Options Paper*, and also the *National ICT Strategy for Education and Training.* ICT policies made under the mandate of the Ministry of Education had therefore found their way into the national ICT policy document, signalling a significant intra-tier activity between the Ministry of Information and the Ministry of Education.

This phase saw a period of intensified ICT policy making activities in the education sector. The National ICT Policy also evolved under the stewardship of various Tier 2 Ministries and Tier 3 stakeholder organizations including the civil society organizations and other private sector associations. The Ministry of Information

finally published the *National ICT Policy*, which incorporated a number of provisions in the policy documents published by the Ministry of Education. The involvement of Tier 1 organisations in the ICT policy making process became more and more direct, as seen in the participation of the VVOB in the ICT for PTE curriculum and the development of the *ICT in Education Options Paper* supported by USAID. The policy focus on ICT infrastructure remained predominant. Evidence of cross-tier and intra-tier collaboration on policy making initiatives became more evident towards the end of this phase.

8.1.4 Conclusion

The following key points emerge in this section:

- ICT Policy making activities throughout the post independence Kenya was concentrated at Tiers 1 and 2, with some minimal activity at Tier 3. ICT policies in the education sector in Kenya generally seemed to be a response to international, regional and national influences.

- There is also evidence of technology pull (Bottino, 2003) where educational ICT policy decisions were made in line with the technologies that were prevalent at the time. A change on technology focus therefore determined a change in policy focus. This is exemplified by the move from radio in the first phase, to computers and internet in the later phases. Later, between 1997 and 2007, which covers the study period, policy initiatives to provide Internet connectivity to learning institutions, notably through the collaboration between CCK and KENET, appears to mark the beginning of a renewed focus on use of ICTs, especially the Internet, in education in Kenya. Related to this was the tendency of policies and related initiatives

on ICT infrastructure to precede policies on other elements of the ICT policy implementation like an official national curriculum and teacher development policies.

- The documentary analysis revealed that the evolution of ICT policies in Kenya since independence had very much been based on centralized government-led policy making initiatives. Whereas Tier 1 influences were evident throughout the period, the involvement of these Tier 1 organizations in ICT policy development seemed to be limited to interaction with Tier 2 institutions that were mainly government Ministries or equivalent institutions. A number of ICT policies that originated at Tier 2 created needs and gaps that actors in Tier 4 institutions responded to.

- The relationship between democracy and ICT policy making also seemed to stand out in this analysis. Efforts towards the realization of a national ICT policy intensified with the election, in 2002, of a new government that pledged 'zero tolerance on corruption' (Narc Manifesto, 2002) and prioritized policies that aimed at wealth creation. These seemed to set the pace for the education sector that equally made great advances in ICT policy development for teacher education.

- Finally, the evolution of ICT policies in education in Kenya also seemed to demonstrate that over time, especially in the Post-1999 phase, there had evolved a tridimensional understanding of the role of ICT in teacher Education in Kenya as evidenced in various policy statements and documents. In some instances, ICT was seen as a subject to be covered by student teachers who desired to teach the Computer Studies in secondary schools. In others, it was regarded as a set of skills that pre-service

teachers needed in order for them to teach better or meet certain market demands; and finally, in some policy statements and documents, ICT was regarded as a tool whose integration with the teaching subjects would result in new pedagogies that would transform teaching approaches. It is evident that the ICT implementation patterns predominantly remained Type I in that they aimed to sustain the traditional teaching practices that did not in any way transform the teaching routines.

8.2 ICT policy implementation in teacher education 1997 – 2007

Introduction

In this section, I begin by looking to some depth, at the ways in which ICT policies were implemented within and between the Tiers outlined in the 4-Tier framework. I particularly focus on teacher education policies, programmes and related initiatives in Kenya that were implemented in the period between 1997 and 2007. Whereas national ICT policies tended to be largely influenced by developments at Tiers 1 and 2 as evidenced in the previous section, activity depicting interpretation and actual implementation of ICT policy in teacher education programmes becomes more evident at Tiers 3 and 4 of the framework (Chapters 6 and 7).

I focus closely on evidence drawn from the 3 case institutions where teacher education programmes were implemented. In Cases 1 and 3, school-based teacher education programmes with a cascade training model were adopted. The analysis of the data from these two cases includes the teachers' perspectives on their own training experience and the extent to which this training influenced their practice as teachers within the institutions. Case 2, is an on-campus pre-service

teacher education institution that offers the national ICT curriculum as part of the pre-service teacher education programme.

I also make reference to data drawn from the documentary evidence and, where appropriate, the perspectives of the key stakeholders presented in Chapter 6. The points of analysis in this section draw directly from the themes that emerge from the analysis and discussion in Section 8.1 above, and also the literature review carried out earlier on in Chapters 2 and 3 of this study. In this analysis, I do not assume a direct causal link between the activities in the Case institutions and the national ICT policies discussed earlier, but instead consider policy as only one of the possible determinants of processes and activities in the teacher education programmes (Elmore, 1979). Other possible determinants include the priority accorded to computer hardware, software and the internet in the institutions, and their configuration to support administration and pedagogy. Others include the teacher education curriculum and the associated training models, institutional implementation strategy or lack of it, and the enduring nature of the traditional teaching practices in schools and teacher education institutions.

I structure my discussion in this section under the following 3 broad themes:

- Understandings of ICT policy priorities in teacher education
- An analysis of ICT practices in teacher education
- Educational structures, beliefs, and practices

8.2.1 Understandings of ICT policy priorities in teacher education

The national ICT policy statements and documents analysed covered a range of themes to varying depths. The statements and themes that are of relevance to teacher education are given in greater detail in Section 8.1 and also Appendix 8, and address the 8 key areas presented in Figure 10 below.

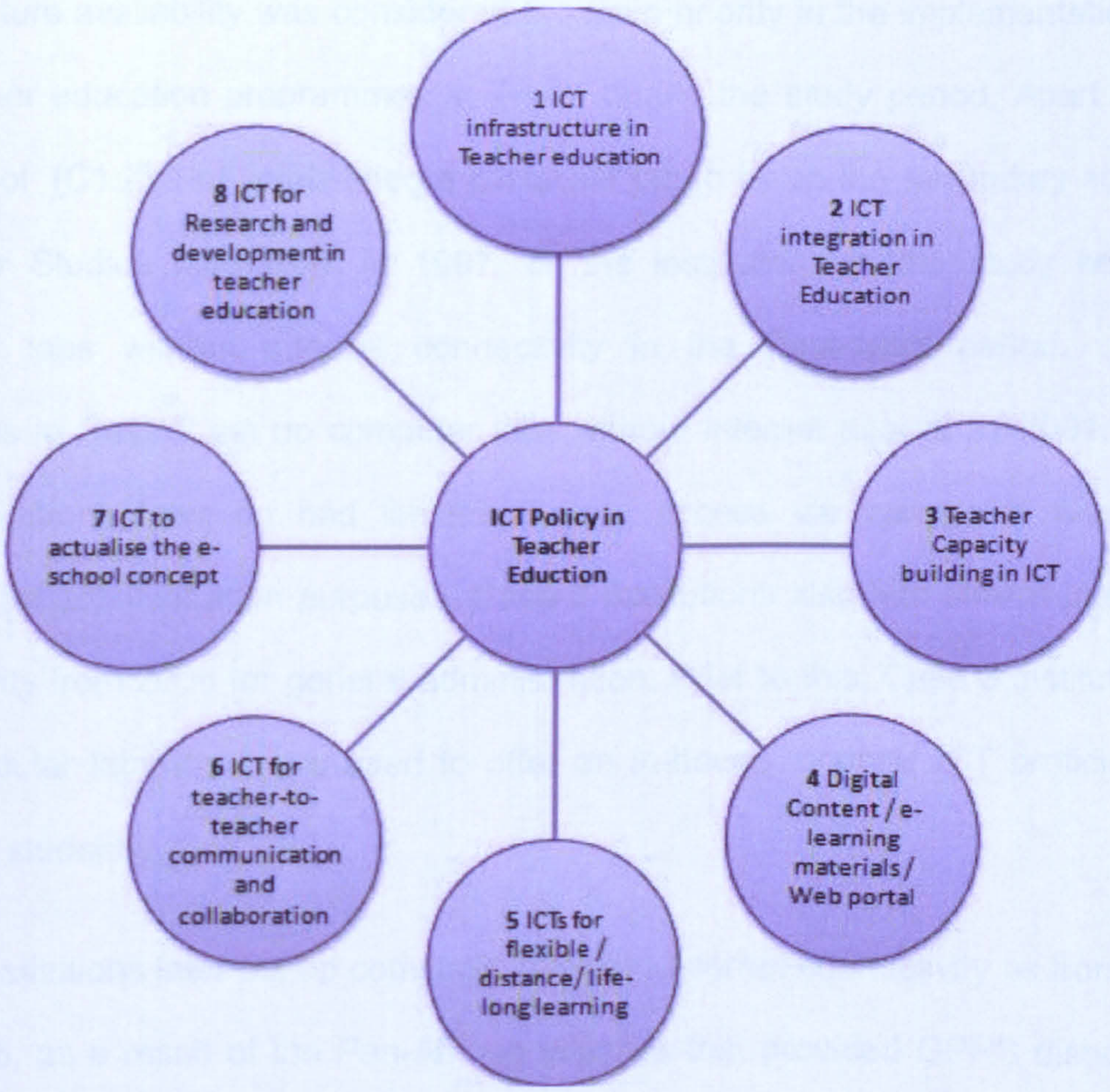

Figure 10: The national ICT policy themes relevant to teacher education in Kenya

From my study, it is clear that policy development was predominantly driven by the first theme, ICT infrastructure in teacher education, which emphasised the need to provide ICT equipment, including, later in the decade, internet connectivity to education and training institutions. At the implementation level, ICT infrastructure

availability or non-availability, particularly computers and the Internet also determined the ICT implementation priorities and processes in the teacher education programmes in the study. Just as witnessed in the policy development process in Tiers 1 and 2, ICT infrastructure was a priority investment in Tiers 3 and 4, with the consequence that its configuration within the educational institutions greatly determined practice in the Case programmes.

The interviews with participants in the Case programmes demonstrated that ICT infrastructure availability was considered the main priority in the implementation of the teacher education programmes at Tier 4 during the study period. Apart from one school (C1.2) that established a computer lab to teach the secondary school Computer Studies curriculum in 1997, all the institutions in the study set up computer labs without internet connectivity in the Post-1999 period. The institutions in Case 2 set up computer labs without internet access by 2001, and both institutions later on had limited internet access via low-speed wireless modems for administration purposes. Case 3 institutions also had similar internet connectivity from 2006 for general administration. Prior to this, Case 3 institutions had computer labs that were used to offer an in-house modular ICT proficiency course to students.

Case 1 institutions later set up computer labs with internet connectivity as from the year 2005, as a result of the Pan-African initiative that provided GPRS dishes to the schools as part of the equipment donated to the NEPAD eSchools initiative. This priority accorded to ICT equipment purchase did echo the priority accorded to ICT infrastructure in the policy documents (Republic of Kenya, 2005; Republic of Kenya, 2006a) This had a major influence in the understanding of the role of ICT in the teacher education programmes and in the schools in general.

In terms of the configuration of ICT equipment, the 3 Case programmes had all set up a central computer laboratory, equipped with a varied number of personal computers, and related peripherals like printers and a GPRS dish for internet connectivity. The existence of a centralized computer laboratory in Cases 1 and 3 determined that the trainee teachers had limited access to the course material they needed to use during the on-going school-based ICT training. This homogeneous adoption of the centralized computer access model in the Case institutions may be a result of influence by earlier models in institutions of higher education and some middle level colleges that set up computer labs as one of the 'classrooms' where Computer Science would be taught. The same approach was adopted by the secondary schools when they began to offer Computer Studies as a subject. The earlier conception of the 'Computer as subject' may have been the reason behind the prevalence of this model. The reasons given by some respondents were also purely logistical and unique to the African context:

> Computers remain valuable equipment in many institutions in Africa as their cost has been rather high. Many leaders in learning institutions would like to have them in one room that can be properly secured to prevent burglary. Another reason is also the fact that many schools and teacher training colleges may not have had mains electricity and so the computer labs had to be configured in ways that might allow easy use of alternative sources of energy like small generators and solar panels. Lack of physical space to place computers may also have been a factor as most classrooms are overenrolled and there is virtually no free space (K 22).

> Owing to licensing costs, some institutions preferred thin client solutions and which required licensed software to be installed on the server only. This meant that the server and the dummy computers had to be in the same room since the thin client server is not easy to implement in a distributed set up (N2).

I would argue that technologies in education in the immediate dates preceding the study period, which was predominantly the radio, involved portable and standalone devices that could be carried around classrooms by teachers. However, computers at the time were rather bulky with various components and

the computer was therefore not a suitable technology to carry around classes; it was more convenient to access the computers at a central point. Equally importantly computers were understood, during the early period of my study, to support a specific subject in the curriculum and so belonged to the 'lab' that was designated for the teaching of this subject, just like other science-based subjects in the curriculum that had designated teaching labs for practical lessons.

The teacher training model adopted for Cases 1 and 3 programmes was a cascade training model where selected teachers (respectively referred to as 'Champions' and 'Master Trainers' in Cases 1 and 3), received ICT training at an external location that was well equipped with computers and internet access, and were then expected to carry out school-based training of their colleagues, using the computer facilities within the school, which were, in both cases, also used to train students in the institutions in various aspects of ICT use. From analysis of the teacher education curriculum in the two programmes, it was evident that computer skills that prepared them to use the various computer equipment and productivity software were the focus of the school based training. The Champions in Case 1, however, had been exposed to a curriculum (Appendix 4) that required them to train their colleagues on ICT-pedagogy integration rather than merely focus on ICT skills.

This cascade model of training offered a curriculum that was a product of cross-tier consultation between e-learning officials at the Ministry of Education and personnel at the NEPAD Secretariat on the basis of the NEPAD e-schools continental rationale and guidelines. The model did not, however, provide for processes that ensured that the ICT-pedagogy integration curriculum content offered to the Champions in Case 1, reached the teachers in school in the form

planned. The focus of on-going teacher training at the Case 1 institutions remained on ICT skills around equipment use and general ICT literacy to meet the immediate needs in the school set-up.

The training model was based on the assumption that training in Cases 1 and 3 would require regular and sometimes guided access by trainee teachers to the computer facilities at the institution, yet access by these trainee teachers and their designated trainers was limited to periods when the students were not taking lessons in the computer laboratory. The school-based ICT training for the trainee teachers in Cases 1 and 3 programmes, therefore, had to be scheduled in a manner that did not inconvenience the regular learners in the school for whom the computer laboratory served as one of their learning rooms or classrooms. The predominant understanding in the two Case programmes was that the computer lab was essentially meant for student use for teach the subject Computer Studies and not teacher use. Lack of computer access for teachers at departmental level further impeded teacher access to training resources. Further challenges experienced in the implementation of the cascade training model in the teacher education programmes are discussed in Section 8.2.2.

A similar scenario prevailed in Case 2. The teacher educators of subjects other than ICT could not access the computer lab as it was designated as a student lab for the pre-service trainee teachers (See: Section 7.2). Besides, the single lab was not adequate for the acquisition of the required skills by the pre-service teachers. The budget for computer equipment was certainly high compared to the investment on other teaching and learning infrastructure, leading to pre-service teachers paying a mandatory extra levy to undertake the ICT course offered as part of the national PTE curriculum. Despite this, the pre-service teachers only

accessed the computer lab a few times a week in a classroom context where the computer student ratio stood at an average of 1:3. Full competency as provided for in the syllabus was hard to achieve in this scenario:

> ...at the time of graduation, very few of the pre-service students are competent enough to accomplish tasks requiring use of basic productivity programmes like the word processor. They hardly find the space to touch the keyboard since they are many and the computers are few (dean of curriculum: C2.1-P4)

My study demonstrates that teacher and teacher educator access to computers for purposes of institution-based training remained restricted or limited within the institutions in all 3 Case programmes despite the fact that the national ICT policies and programme documentation seemed to acknowledge the important role that computers, the internet and other technologies would play in education in general and in teacher education in particular. Teachers tended to compete for space in the computer laboratory, which was in all three Cases understood to be for student use only, as discussed above. The resultant general lack of knowledge in use of computers, which seemed to be the natural outcome of this restricted access, determined that a number of the teachers felt they needed to gain computer literacy skills way before they understood how to integrate ICT into their various subjects:

> Teacher educators need to know how to use the computers first and foremost. How can you integrate something that you cannot use into your teaching? (lecturer of English: C2.1-P7)

Another emerging issue was that the first computers that were bought were understood to be for administrative rather than teaching purposes in all 3 Case institutions, particularly earlier on in the study period. This effectively meant that computer applications that were installed and available at the institutions were those meant to help accomplish tasks that would make administrative tasks easier and faster, rather than enhance pedagogy in the institutions. Teachers were

therefore keener to learn the skills that sharpened their administrative acumen rather than those that made them teach differently. This was particularly true of the period before internet connectivity was realised in schools and teacher education institutions, as observed by one respondent:

> We [the Master Trainers] were equipping them [other members of staff] with skills which they could also use in their daily teaching activities like preparation of the examinations and just using computers as teaching aids. (head of ICT: C2.2-P13)

This indicates that even in instances like Cases 1 and 3, where ICT was already being offered as a teaching subject, , the teachers perceived their training to be geared more towards the use of ICT for administrative purposes and / or to teach the subject Computer Studies.

This scenario reflects what Tubin (2006) referred to as Type I ICT implementation, where ICT is integrated in a 'two-dimensional configuration' in which there are only two sides: teachers and students, with computers necessitating the occasional contact (p88). The computers are located in labs, which the students attend for one or two hours a week and the ICT assignments are controlled by the teachers. As seen in Case 2 involving the pre-service teacher education programme, ICT resources were allocated equally for all students in terms of specific access hours and periods in a week, and the orientation was toward inputs (number of computers) and outputs in the form of examination scores.

The predominant focus of all three Case programmes on computer acquisition and setting up of computer laboratories between 1997 and 2005 can be attributed, to some extent, to the leading role that the Ministry of Information and Communication played in the ICT policy development process in Kenya during the period (See: Chapter 5). ICT infrastructure, right from the days of the radio through

to the internet, was presented as a tool that was important for the learning and teaching process in the education system. However, the policy documents, particularly the National ICT Policy (Republic of Kenya, 2006b) which was developed in a process spearheaded by the Ministry of Information and Communications, did not engage in the details of curriculum modification that would have been necessary in the education sector to ensure that these ICT tools supported and transformed learning and teaching of subjects by the teachers, as expected in a Type II implementation (Tubin, 2006)

The absence of intra-Tier coordination at Tier 2 was a major factor in the predominant focus and prioritization of ICT infrastructure acquisition and set up for student access, since the national ICT policy process continued to be fronted by the Ministry of Information and Communications, whose primary responsibility was to outline the infrastructural and connectivity needs of the learning and training institutions and the rest of the sectors in the country as a whole.

With the exception of institutions in Case 1 where there were labs with internet connectivity set up in 2005, computer laboratories that were established in all Tier 4 institutions to teach ICT as a content area did not have internet connectivity. The teachers and other stakeholders interviewed observed that the presence of ICT infrastructure in their institutions had not changed the pedagogy in teacher education owing to lack of internet connectivity. Despite the policies advocating for integration of ICT in teacher education and use of ICT and the Internet for increased flexibility and interactivity with learners (Republic of Kenya, 2005; Republic of Kenya 2006a), perspectives of participants suggested that the tradition of teaching had largely remained the same as there was no other way to interact with one another or with students other than a face to face context.

The key points in this section include the following:

- stakeholders in Tiers 3 and 4 placed high priority on ICT hardware. The choice of ICT infrastructure, space configuration in terms of a centralised computer laboratory, scheduling of training and teaching sessions and routines that go with them, and non availability of internet connectivity determined that Tier 4 institutions focused on ICT infrastructure acquisition for teaching ICT or Computer Studies as a discrete subject to the students and pre-service teachers

- hardware availability and configuration also had significant influence on general trainee teacher access and the overall training models adopted for school-based teacher education programmes

- understandings of ICT consequently focused on the use of these ICT equipment for administration and ICT skills development

- understandings of the priority role of ICT hardware also influenced the form and content of the ICT training that the teachers and the teacher educators got in all 3 Case programmes; and,

- training practices in these institutions tended not to encourage integration of ICT into the overall pedagogic practices

8.2.2 An analysis of ICT practices in teacher education

The introduction, by the Ministry of Education, of Computer Studies as a teaching subject in secondary schools in 1996, made it necessary for some Tier 4 institutions to either employ untrained teachers who had graduated with a Diploma in IT from technical institutions (See: Figure 3) or organise school-based training programmes for teachers of other subjects to take on Computer Studies as one additional teaching subject. This was particularly the case in institutions in Cases 1 and 3, which were secondary school level cases. This response by Tier 3 and 4 institutions provided one of the earliest initiatives aimed at building teacher capacity to teach Computer Studies.

The *National ICT strategy for Education and Training* published in the year 2006, which was the first explicit strategy document of relevance to the study, described a centralised model of innovation that would determine national, school and classroom level implementation of ICT in the education sector, in line with the national ICT policy framework and developmental priorities:

> The strategy gives a snapshot of what is required for ICTs not only to have an impact in reducing the digital divide but also as a tool for curriculum delivery and learning... The overall objective of the plan is to ensure that systematic efforts are made towards strengthening adoption and use of ICT in the education sector with appropriate attention given to education development priorities as outlined in the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC, 2003-2007); Sessional Paper No. 1 of 2005...and the United Nations' Millennium Development Goals (MDGs) (Republic of Kenya 2006a: piv-vii).

This centralised ICT strategy development, which would support system-wide educational change, seemed to be determined by the fact that the education system and the policy development process was largely centralised and concentrated at Tiers 1 and 2 of the policy development and implementation framework. The national strategy, whose mission is 'to integrate ICT in education

and training for improved access, learning and administration' (Republic of Kenya, 2006a: piii) had the following among its 11 strategic components:

- integration of ICTs in education
- digital equipment
- connectivity and network infrastructure, and,
- training, capacity building and professional development

An important point to note at this point, therefore, is that ICTs were being implemented in various ways in teacher education and the education sector in general during the study period, without there being a national strategy for education and training until the year 2006. The participants in the Case institutions had neither seen the strategy document, nor did their institutions have their own institutional ICT policies and strategic plans at the time of data collection. The exception was Case 2.1 that had a generic institutional Strategic Plan for the 2007-2012 period, where ICT infrastructure was planned for as part of the government guidelines:

> The college is implementing Information and Communications Technology (ICT) ...in line with the Ministry of Education guidelines...The (institutional) Strategic Plan endeavours to advance in ICT and integrate it into teacher education programmes (C 2.1 Strategic Plan, Page 12).

This section of my thesis is, therefore, not an attempt to draw a causal link between ICT practices in teacher education and the policy documents published in the study period. The *National ICT Strategy for Education and Training* is, however, an important point of reference, being the only national strategy document that made specific projections for the implementation of ICT in education in general and teacher education in particular. I therefore make reference to it where this adds understanding to certain practices in education and teacher education as perceived by respondents. I have also interrogated various

practices in the Case institutions against the analytic points that evolved in the research literature and the national ICT policy statements. This sub-section is therefore discussed around the following two sub-themes: Curriculum, training and capacity building; and, institutional policy implementation challenges.

Curriculum, training and capacity building

An analysis of the interview data shows a significant development in Tier 2 between 2001 and 2005 that influenced roles in Tier 4 was the deployment of more trained teachers of the subject Computer Studies by the TSC to the institutions that were already offering the subject. The first batch of teachers trained to teach Computer Studies were posted to schools in 2001, and this led to some ICT trained teachers in both Case 1 and 3 institutions reverting to teaching their former subjects. Up till this moment, ICT appeared to be considered by players in the Tier 3 and 4 institutions as the extra subject that some teachers had trained to teach and a necessary skill needed by all teachers.

With the launch of the NEPAD e-schools initiative in 2005, the focus in Cases 1 and 3 institutions seemed to change from skills training to ICT skills for pedagogic practice. This is evidenced in the curriculum developed for the teacher development programme in Case 1 (Appendix 4).

The curriculum for the teacher education programme for Case 3 (Appendix 6) did not explicitly cover aspects in ICT integration in the subjects. The focus, as evidenced in the curriculum, was on training teachers of Computer Studies, training other subject teachers on ICT skills and computer maintenance. However, interviews with individuals in Tier 3 revealed a deeper understanding of the need

to train teachers on ICT-pedagogy integration based on the organisational curriculum and preparation of relevant digital content:

> We strongly advocate for ICT literacy amongst educators so that they can transform and enrich pedagogy for the benefit of all students. Thus, the people in the education sector are our primary target clients. To facilitate the optimum use of the computers that we place, we have developed curricula for use in learning institutions, administer examinations and issue certificates to those that successfully undertake them. Digital multimedia content for secondary school subjects has been developed and is in use in a number of schools (CFSK, 2009).

Evidence from the Case 3 institutions did not exhibit an understanding of this strategy position given by CFSK on their website. This understanding of the potential of ICT to enrich pedagogy was yet to be embraced in the Tier 4 institutions as the focus of in-house training and also the residential training of the master-trainers remained on computer as subject, basic computer literacy skills and computer maintenance.

It is also evident from the interviews conducted with players in Case 2 that the lack of fundamental changes in the overall PTE curriculum made it difficult to implement widespread ICT integration across the subjects offered to the pre-service teachers. The unclear understanding of the role of ICT in the subjects other than ICT and the general lack of the requisite e-content made it difficult for the teacher educators of other subjects to support the implementation of ICT within the subjects offered in the Case 2 institutions:

> I think the main problem is still the Ministry [of Education]. When things like technology are introduced, lecturers are supposed to be made aware of why those technologies are there ...the computers have been introduced when teachers are already teaching. So the Ministry [of Education] should come up with some programs ... there must be a lot of programs which can be taught through computers, but because we are not aware of them, it will be very difficult for me (C 2.1-P7).

Despite the existence of the explicit policy direction provided by Tier 2 regarding ICT integration in Primary Teacher Education, practice in primary teacher

education institutions, therefore, remained focused on ICT as a skills subject that the national curriculum prescribed and none of the ICT lecturers in the two Case institutions went beyond teaching the additional topic in a 2-hour lecture.

Whereas international and regional influences had been witnessed to varied degrees in the policy development process (See: Chapter 5 and 8.1), it was apparent that the influence that Tier 1 organisations had on implementation strategies in Tier 4 organisations were more direct where a non–state actor or leadership level existed in the implementation hierarchy. The national NEPAD Secretariat and the national CFSK leadership are examples of such non-state actors since they were independent organs in wider international organisations, but helped in implementing programmes within Tier 4 in line with the guidelines agreed upon between Tiers 1 and 2. The CFSK leadership developed a computer training curriculum for teachers modelled around the Canadian model of Computers-for-Schools programme (Appendix 6). The NEPAD e-schools teacher education training guidelines for instance, anticipated that teachers would be trained to attain computer literacy skills and improve their classroom teaching through ICT integrated teaching:

Interview data revealed that this strategy was only attained in part. The staff and administration at Case 1 institutions did not appear to sufficiently own the ICT training programmes to the extent that they monitored outcomes. There were no internal audits of monitoring progress with ICT at the institution, as suggested by an administrator at Case 1.1:

> No we don't [carry out audits]. Once we realize that they [teachers] are using the skills to train students, I think that one is an audit enough. That whatever he has acquired, he is now using it to impart knowledge to the students. That alone is an audit (deputy principal: C1.1-N4).

Overdependence on donor aid for most of the policy making and implementation activities may also be seen to be responsible for lack of ownership of the national ICT policies at the institutional level, hence this failure to monitor progress. Donor organisations like the USAID, IMF and regional bodies like the NEPAD may support policy making initiatives that bear their stamp, which may not necessarily be context sensitive (Ball, 1997).

Whereas globalisation and cross-national influence impacted upon ICT policy implementation in teacher education in Kenya, as witnessed in Cases 1 and 3, teachers especially in Case 1 institutions considered digital content given to them to use as student teaching resource material as 'foreign' since, in the opinion of some of them, the content did not fit with the Kenyan national curriculum - it had been developed in South Africa. They considered it irrelevant yet their own training was anchored on implementing it within the schools by training their colleagues to use it, besides using them for their own lessons.

As demonstrated in the evidence below, a number of participants suggested that the content that they were exposed to during training did not support the local curriculum and some of them suggested they would prefer content that was responsive to the local curriculum. For others, the foreign e-content presented problems in school and some teachers shied away from ICT as a result. A further cause of apparent lack of ownership of these policies by the teachers during implementation was the perception that they had not been adequately represented in the decision making process:

> Most of the negotiations were done at high levels. Then the Principal was supposed to identify those who could spearhead the whole programme at the school level (head of ICT: C.1.1-N7).

Other studies conducted on this aspect in Kenya and elsewhere focus more on shared ownership of something new on the part of large numbers of people, which is tantamount to real change but ownership is not acquired that easily (Elmore 1996). When people are apparently in favour of a particular change, they may not 'own it' in the sense of understanding it and being skilled at it; that is, they may not know what they are doing (Fullan, 2001; 92). Ownership in the sense of clarity, skill and commitment is a progressive process. Fullan adds that true ownership is not something that occurs magically at the beginning, but rather is something that comes out the other end of a successful change process. The teachers in my study were at the lower stages of progression which may have affected the level of ownership.

Consultation with a wide stakeholder base has been said to be one way of achieving ownership. The amount of involvement desirable of the stakeholders at the various levels of the policy making and implementation process has been researched before. There is evidence of the need for stakeholder ownership of any innovation by all those involved if it is to stand a fair chance of succeeding (Galton, 1980; McClelland, 1991).

The National ICT Strategy for Education and Training made active reference to 'stakeholders' all through the document as highlighted below:

> The Ministry has been working in close consultation with *various stakeholders* to develop of a comprehensive roadmap to guide the sector in the adoption of appropriate technology in all the three categories of ICTs (Republic of Kenya, 2006a: piv).
>
> The Ministry, sector partners and *stakeholders* have developed this National ICT Strategy for Education and Training aimed at guiding the sector in the adoption of ICTs across all levels of education and training. (Republic of Kenya, 2006a: pv).
>
> The Ministry has developed this National ICT Strategy for Education and Training through collaboration with all sector *stakeholders*. Without the

> support from each and every member from private and/or public, academia and/or civil society organizations, would not have been possible to realize this course (Republic of Kenya, 2006a: pvi).

However, Appendix 7 of the same document shows that there was no teacher listed among the 15 members of the preparation team as shown in Figure 11 below:

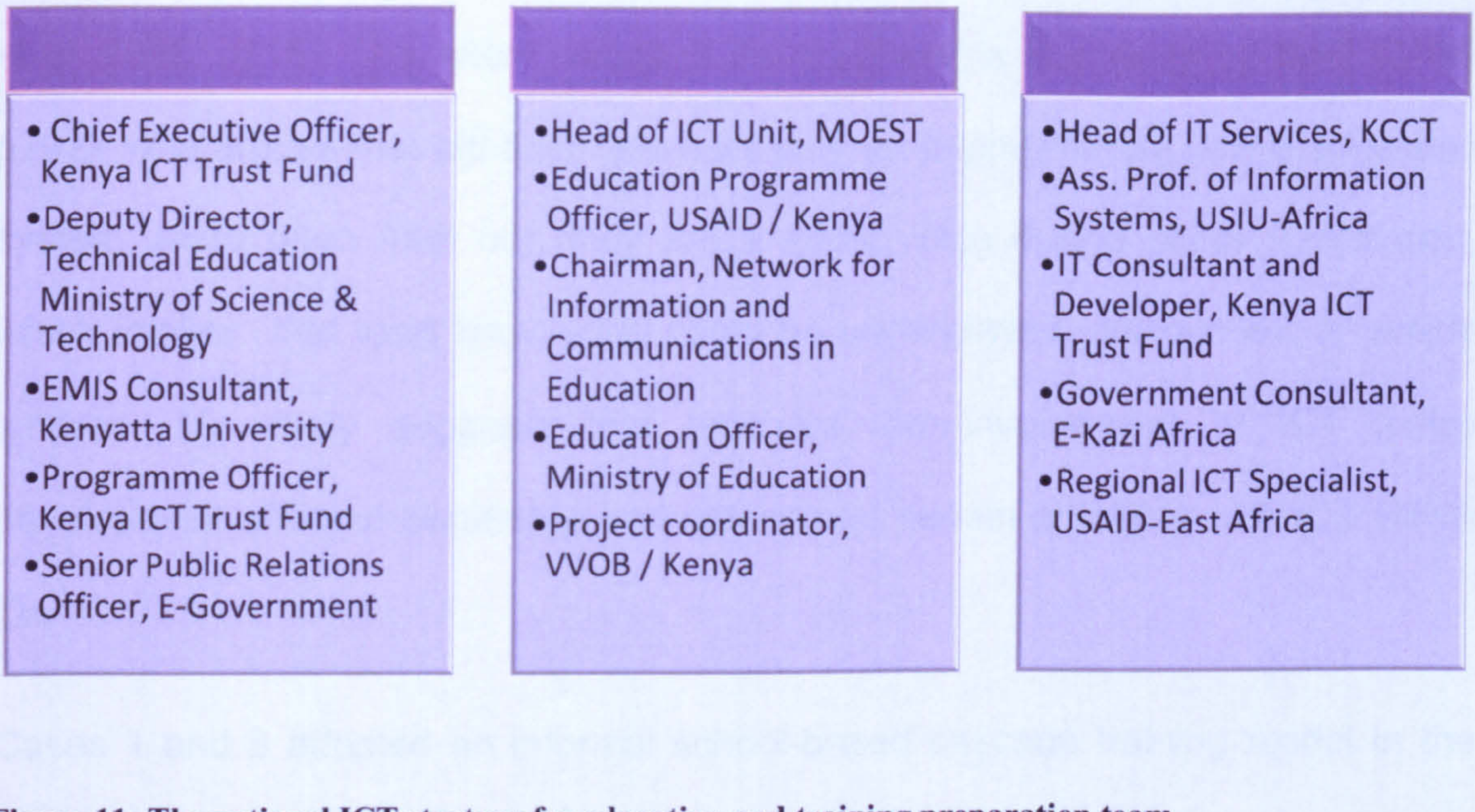

Figure 11: The national ICT strategy for education and training preparation team

The composition of this particular policy development team reflected representation of a diverse stakeholder base. The manner and extent to which teachers contributed to this process is not stated in the document. The teacher participants in my study did not seem to identify with the provisions of this or other national ICT policy documents. One respondent, who works for one of the organisations represented in this team, felt that the top-down conceptualisation of ICT policy prompted a lack of ownership of the national ICT curriculum and other components of the strategy among teachers. He said:

> The ICT policy development process at the Ministry of Education in Kenya is quite elitist. A group of people who are perceived to be 'young technocrats' are arbitrarily selected and they sit down and come up with a policy document. I don't think any views are ever collected from the

> teachers because they probably assume the teachers may not have an opinion about ICT in education (K23).

The review of the research literature does indicate that policy makers must work with rather than around teachers in the policy development and implementation process. A study conducted in Botswana schools noted that subtle teacher resistance can undermine implementation of the most 'teacher-proof' innovations. It suggested that teachers cannot be 'circumvented' in the reform process (Perry et al. 1995: p115). The 'silent voices of the teachers' is discussed by Smit (2005: p292), who argues that although teachers play an important role in our education system, more often than not, they are a silent voice during policy formulation, which implies that local knowledge might be underplayed, discounted, or simply ignored. My study suggests that teachers' non-involvement in ICT policy development affected ownership and determined certain practices with ICT within Tier 4.

Cases 1 and 3 adopted an informal school-based cascade training model in the ICT training programmes for teachers organised during the study period. At the time of collecting data, Case 1 had held one central residential training for the Champions and several in-school training sessions for the subject teachers in school including Computer Studies teachers. Case 3 had held several residential training sessions for the teachers from their partner schools and also some in-school training for teachers of other subjects. In both cases, there was some level of discretion in the perception of the role of ICT in both teacher education programmes. The participants interviewed variously referred to the training programmes in terms that reflected not only the informality with which they perceived the programmes, but also their varied understanding of the role of the ICT training component of the teacher education programmes (See: Chapter 7). In

one instance, an individual respondent would refer to the same programme in different ways that gave different connotations of informality, as witnessed below:

> When they came back, they had some content that they had been given. They put it in the server. So they had to *in-service* us on how to use some of these programmes. Most of them were actually programmes that were meant to enhance content in other subjects like Mathematics, English, Geography. The only thing that was missing there was Kiswahili but the rest of the subjects were there. Then they also *in-serviced* us on how to use the *SmartBoard*™ and so on, which was a relatively newer technology. Actually you know that *training* they went for was only for all the schools that were running the computer based NEPAD programme. So they went to be *briefed* so that they could come back and *brief* others *[Emphasis own]* (director of studies: C1.2-N12).

This exemplified a general lack of consensus on the content and form of the training programmes. Other participants also indicated that there was no mechanism for feeding back to the higher Tiers in the decision making hierarchy of the outcomes of this ICT training model:

> We have had meetings with colleagues from sister schools. But I do not think our discussions have been used to improve the programme...Yes, we discussed the challenges in implementing the programme but we have not seen any action to suggest that the outcomes of these discussions have been incorporated into the training programme (director of studies: C1.1-N6).

This was one of the implementation drawbacks of the cascade model of training as the trainees in the subsequent levels had no way of integrating participant input. Studies elsewhere support this finding and suggest that one drawback of the cascade model is that once it has been set in motion, it is difficult to view it as anything but a one-way transmission, and that it does not easily lend itself to the process of improving itself with constant review based on input by participants owing to many intervening implementation levels:

> The cascade method does not lend itself easily to [this] process... what is seen as a problem by one particular [level] may not be seen as a problem by other [levels] at the same or different [implementation] levels. Even where problems are identified as fairly widespread, there are considerable logistical problems in ensuring that the modified ideas filter down through the same channels. There are also very few opportunities to check that the

> areas the trainers perceive as problematic reflect the real problems in the classroom (McDevitt, 1998: p427).

The perception of these ICT training sessions as 'workshops' also suggested an informal training that would have short term rather than long term impact as was already evident in Case 1 institutions. Research literature suggests that although workshops are often perceived as enjoyable and enlightening, they frequently seem to have little long-term impact, as the daily routine that participants return to very quickly erodes their enthusiasm (Lamb, 1995; Pacek, 1996). The cascade model not only demands a fairly quick transition from passive participant to active facilitator but also requires a more thorough understanding of the ideas themselves (McDevitt, 1998). The perceptions of the training sessions as 'workshops' was responsible for the informality associated with ICT training for teachers in all three Case programmes, in terms of the time it took to train the teachers and teacher educators and the perceived depth of coverage.

Interviews with stakeholders and participants in the Case programmes suggested that pre-service and in-service teacher education programmes did not provide prospective teachers and serving teachers with the necessary skills, competencies, and experiences to prepare them to use ICTs effectively in their future profession. This consequently led to disjuncture in ICT training and capacity building policy intentions and actual outcomes of programmes for teachers and teacher educators. The curricula for teacher training were as varied as the teacher education programmes. Even among the Case 2 institutions that were bound by a national curriculum, the interpretation of the syllabus was varied and some lecturers of ICT went as far as editing the national curriculum to fit with their own interpretation of the needs of the pre-service teachers. One respondent reported:

> I thought the curriculum was really too broad and beating about the bush, you know, going the long way. So I decided let me just go straight to the point, teach as much as I can. I had actually requested the, [the administration] to increase the number of contact hours for 1st year from 1 hour to 2 hours (head of ICT: C2.1-P6).

Further to this, and as already discussed in Chapter 7 of this thesis, the syllabus for pre-service teacher education in Case 2 programmes read very much like the syllabus for Computer Studies that was offered as an elective subject in secondary schools. The syllabus for PTTCs published in the year 2004 did not therefore include any special competencies for teachers, particularly around instructional practices and knowledge of the curriculum and the ability to develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning.

Studies have suggested that teachers require more than just a repertoire of basic ICT skills and need a wider knowledge base and competencies in new pedagogies in order to embrace technology-based instructional practices (UNESCO, 2002b). Other competencies include collaboration and networking that acknowledges the communicative potential of ICTs to extend learning beyond the classroom walls; social issues aspect of ICT competence and finally, technical issues through which teachers would update skills with hardware and software as new generations of technology emerge.

My study reveals that there was a general lack of capacity in teacher educators in Case 2 institutions to model best practice with ICTs for trainee teachers. This was both a result of lack of the requisite skills and competencies among the teacher educators on one hand, and the necessary access to ICT teaching and learning resources in Case 2 institutions. This came across as a major barrier to ICT policy implementation in these institutions.

This kind of disjuncture is discussed by Duran (2000), Moursund and Bielefeldt (1999), Bullock (2004) and Mehlinger and Powers (2002). The literature mentioned above suggests that the integration of ICTs into pre-service teacher education is influenced by many barriers, one of which is the lack of the requisite skills among teacher educators. Also prevalent in the literature is the suggestion that main barriers should be identified when incorporating ICTs in teacher education. Towards this end, Ertmer (1999) classified barriers as falling into two primary categories: extrinsic (first order) and intrinsic (second order):

> Extrinsic barriers include lack of resources, inadequate training, insufficient technical support, and lack of time; intrinsic barriers include teachers'/instructors' beliefs, visions concerning technology integration, and views about teaching, learning, and knowledge (Ertmer,1999: p51–52).

The extrinsic barriers in my study include the access challenges discussed in the previous section. The beliefs and views of teachers and teacher educators on practice with ICT are examples of intrinsic barriers, and these are discussed in Section 8.2.3 of this chapter. To better prepare prospective teachers and teacher educators to overcome these barriers, enablers are required. Enablers, like barriers, are either extrinsic or intrinsic. Access to hardware, quality software, the Internet, and technical, administrative, and peer support, for instance, might be viewed as extrinsic enablers, whereas personal beliefs, previous success with technology, and self efficacy might be viewed as intrinsic enablers (Ertmer, Ottenbreit-Leftwich, and York, 2007). Enablers are local, not universal (Willis, 2001). The Cases in my study demonstrate that there were both extrinsic and intrinsic barriers to ICT integration in teacher education programmes. These also had implications for ICT integration in the subjects that the teachers taught.

The findings in this section echo those of other studies that have indicated that teacher educator issues are not taken seriously enough by policy makers (Fullan,

2001). Some suggest that teacher educators do not integrate ICTs into their classrooms due to disinterestedness which is caused by their insufficient ability and knowledge in the field. Another problem is overwhelming course load on teacher educators that is understood to cause less time for research and personal development. Lack of time makes teacher educators stay away from ICTs, and they cannot fulfil their personal developments in this field (Goktas, Yildirim and Yildirim, 2009).

The key points arising from this section include the following:

- Practices in Tier 4 teacher education programmes were not always responses to policy intentions in policy statements emanating from the higher Tiers, leading to a disjunction between policy intentions in the higher Tiers and actual practices in the lower Tiers. Tier 1 influences were responsible for the gradual shift towards ICT integrated practice witnessed in Tier 3 and 4 institutions.

- Lack of coordination at Tier 2 seemed to be responsible for the publication of a national ICT curriculum for PTE that did not address any competencies specific to teachers. Lack of fundamental changes in the overall PTE curriculum came in the way of widespread ICT integration across all the subjects offered in the PTTCs.

- The minimal involvement of teachers in the decision making process contributed to lack of ownership of the ICT curricula and the institutional transformation that it was meant to trigger

- The cascade model of capacity building adopted by two Case programmes created a perception of informality in the ICT training. The master trainers

often had to schedule training sessions This affected the level of commitment to these training programmes

- Various teacher education programmes implemented a teacher education curriculum based on the subjective interpretation of the teachers and teacher educators of the place of ICT in education in general and teacher education in particular.

Institutional policy implementation challenges

The need for strategic direction in implementing ICT policies in teacher education has been discussed in the research literature (e.g Unwin, 2005). Investment in ICT infrastructure for teacher education needs to be guided by the administrative, financial, and teaching needs of the teacher education programme, which in turn are reflected in the technology plan that should integrate the vision and strategic direction of the institution (Bates, 2000).

The development of a technology plan can be said to be the first possible enabler for the teacher education programme (Bates, 2000). Every teacher education programme needs to prepare a technology plan that will employ a technology support task force for both technical and instructional purposes. Existing plans, policies, and strategies additionally need to be updated, developed, and spread to all stakeholders. This idea is also supported by a number of other studies (See: Anderson, Varnhagen, and Campbell, 1998; Fabry and Higgs, 1997; Moursund and Bielefeldt, 1999; Rogers, 2003; UNESCO, 2002c).

As observed earlier, none of the institutions in the study had institutional ICT strategy or technology plans. A number of participants said they were neither

aware of, nor had they seen, the *National ICT Strategy for Education and Training* and also the *National ICT Policy* (See: Chapter 7). This reflects the disjunction between the activities in Tier 2 and the teacher education programmes in Tier 4.

It was further evident in my study that where teachers were aware of the provisions of these policy documents, they interpreted the policies based on their own understanding and this resulted in them driving the teacher education agenda in their own ways, what Bagguley (1994) calls the agency of the insubordinates. The responses from the teachers and teacher educators in this study indicated that there existed variability and discretion at the various policy implementation levels (Elmore, 1979), and the outcomes of the ICT policy in teacher education programmes were, therefore, not only unrelated to the ICT policy intentions but also demonstrated disjunction between the policy intention to develop teachers with skills to engage in learner-centred teaching (Republic of Kenya, 2005a) and instead produced teachers who were themselves trained in a teacher-centred setting:

> I search for information on the internet and then I dictate the notes to them [pre-service teachers] during the lesson. I dictate the notes (head of ICT: C2.1-P13).

Variability was therefore predominant in the understanding of the role of ICT relative to the role of the teacher. Whereas one policy statement expected a change in teaching approach, the teacher education programmes did not produce teachers who had this capability but instead used ICT in ways that ensured that the old teaching approaches persisted and the teacher remained the sole source of information (Lambert and Cuper, 2008; Cuban, 1993). The interpretation of the participants in my study of the role of ICT in teaching seemed to uphold the traditional approaches to teaching, despite the training they had undergone.

Some studies have shown that education policy in the form of legislated texts is re-contextualized through different kinds of interpretations. Bowe and Ball (1992) suggest that it is not simply a matter of implementers following a fixed policy text and 'putting the Act into practice' (p10). This explains the inter-tier variations in the implementation policy owing to a difference in the expected output of the policies. In Case 1, for instance, participants felt that policies had been conceptualized at a level higher than the school and so they had no hand in shaping the policies to suit the implementation context.

In the understanding of the Case 3 Tier 3 organisational leadership, the intentions of their teacher education programme seemed to have expanded from providing basic ICT skills, to enabling teachers to integrate ICT in their teaching, develop digital content for teacher education and classroom use, and also develop the capacity of educational managers to manage the institutions more efficiently as suggested in interviews with the officials (C1) and (C4).

The functions and intentions expressed by Case 3 Tier 3 players were not all interpreted and implemented as expressed by the officials. The participants understood the organization's core intention to be focused on training both the students and the teachers on ICT literacy skills. A number of teachers were also trained on hardware maintenance. A disjunction between the intentions of Tier 3 of Case 3 and interpretation of these at Tier 4 of the same Case was evident from the responses by respondents (C13) and (C14).

Another challenge was that of the 'implementation dip' in all three Case programmes. 'Implementation dip' refers to a situation where things get worse before they get better and clearer (Fullan, 2001). There seemed to be a general lack of preparedness for the implementation dip in the teacher education

programmes. Owing to the apparent lack of a clear institutional implementation strategy, ICT policy implementers, that include institutional leadership, boards of governors and teachers at Tier 4, seemed to have been at the early stages of ICT implementation (Roger, 2003), and had not anticipated the problems associated with it, one of which is the implementation dip. Teachers generally seemed to be disoriented by the availability of new technologies and seemed to lack adequate training and knowledge in the technologies both to enable them access their own learning materials and also to teach their subjects. Further more, no support was available to them:

> The computer lab is always busy. How do I access it even to practice my own skills? I don't think the [teacher educators] completed the CPD course because a number of them had expected to use the computer lab to access the material but I don't think this was granted (head of LRC: C 2.1-P5).

Added to this was the observation that ICT had not been mainstreamed in the entire curriculum, making cross-curricular implementation difficult. There was therefore no strategy to deal with the implementation dip. Some studies in this area propose ways in which to deal with implementation dip, one of which is to provide clear strategies that target the social, cultural and institutional dimensions of ICT, as well as the teachers' beliefs around their identity in an ICT implementation matrix (Orlando, 2009).

Teachers should be provided with individualized support through the process of change (Sachs, 1999; Brandt, 2003; Gerber, 1998). It is also important to provide emotional, and related support to teachers for them to continue developing new habits during the implementation dip that reduces effectiveness before the new procedures become routine (See: Chapter 3). The teachers and teacher educators

in my study lacked this kind of support, which would have included an indication of what kind of changes to anticipate and how to handle them.

Some teachers felt confident in and pleased with the varied ways in which they found themselves using ICT in the classroom since they believed it improved their approach to teaching. From the evidence presented below, it emerges that what they 'believed' had changed in their practice did not necessarily reflect a change to

Type II implementation:

> With all my knowledge in ICT, its still has not included the methodologies and pedagogies of teaching Science using ICT. But I have identified which areas in Science I can best teach with ICT. For instance I have just been basically enriching my notes through the Internet because I have a modem. I think it is working very well because I have my class notes updated. Very nice notes. That one I appreciate (head of ICT: C2.2-P13).

Some studies have suggested that the relationship between changes in behaviour, on the one hand, and changes in beliefs or understanding, on the other, requires careful consideration. In many cases, changes in behaviour precede rather than follow changes in belief (Fullan,2001). Fullan argues that the relationship between behavioural and belief change is reciprocal and ongoing, with change in doing or behaviour a necessary experience on the way to breakthroughs in meaning and understanding. The slow change in behaviour can therefore be explained by a slow change in belief, thereby aggravating the implementation dip discussed earlier.

Findings from other studies suggest that if we are to understand teachers' practices mediated by ICT and how and why they change, there is a need to acknowledge aspects such as the role played by social, cultural and institutional representations of ICT, school organisation of ICT, other stakeholders, and professional and personal experiences with ICT, as well as teachers' beliefs

regarding ICT in their role as a teacher (Bruner, 1990; Hernandez-Ramos, 2005; Loveless, 2003; Windschitl and Sahl, 2002). These seemed not to have been taken into account during the policy development processes and built into a proactive implementation strategy, hence the apparent drop in productivity associated with the implementation dip.

Also related to this is the issue of implementation lags (Fullan, 2002) that affect ICT implementation in education. An example in my study can be seen in the period of time that elapsed between the introduction of Computer Studies (1996) and the graduation of the first batch of Computer Studies teachers from the Diploma colleges (2001).Another example from my study is the period it took between the development of the PTE ICT curriculum (2004) and the publication of the accompanying PTE ICT Teaching Guide (2005). This delay seemed to disorient the ICT lecturers in Case 2 institutions and they seemed to prefer to follow the syllabus released earlier than follow the provisions of the teaching guide that made certain demands on them that they considered radical, one of which was to spearhead and coordinate ICT integration across the college.

Other implementation challenges may be attributed to disjunction in the interpretation of policy statements within Tier 4 institutions, particularly those policies that may have been ambiguous. An example is the policy that aimed at having an education system that produced an ICT literate workforce (Republic of Kenya, 2005). The perceived end-product of this policy seemed to be variously interpreted by each of the teacher education programmes. Case 1 programme, for instance, intended to prepare teachers who would both be computer literate and would also be able to use ICT innovatively to teach their subjects. Case 3 focused on training teachers of the subject Computer Studies even though the rhetoric

among the Tier 3 organisational leadership suggested more. My study revealed that teachers of Computer Studies in both Case programmes trained their colleagues on the basic ICT skills, but this did not necessarily result in the cultural and pedagogical change desired in the ICT policies where teachers innovatively used ICT in their regular teaching roles and also for their own life-long learning needs.

The ambiguity in interpretation of the training needs necessary for an IT literate workforce and its expectations on teacher education has also been witnessed in other studies. A UN report suggests that some teacher education courses organised by the government in developing country contexts like Hong Kong, Chinese Taipei and Mainland China with the intention of improving educational effectiveness sometimes do not attain this objective:

> The teacher education courses teach teachers to develop multimedia teaching and learning resources and to use authoring tools to develop computer-aided educational software. The introduction of computers into the curriculum to improve educational effectiveness in these systems has led to a predominant use of computers as electronic presentation tools by teachers in whole class teaching. This seems to be closely related to the importance of teacher-centred instruction and the central role of the textbook in defining the implemented curriculum in these education systems (UNESCO 2003: p91).

In spite of the existence of national ICT policy documents and a National Strategy for Education and Training published in the period under study, this study demonstrates that implementation approaches and strategies evident in the Case programmes were influenced by many factors, and national policy and strategy were just one of these. The absence of a clear training strategy in preparation for the implementation of the policies exposed the teachers and teacher educators to difficulties in implementing the ICT policies. It seemed that the basic ICT skills to which most of the teachers and teacher educators were exposed were not sufficient to anticipate and trigger a change in the overall pedagogy of the

institutions in which the teachers were trained or where they worked. The absence of a training strategy may have presented a challenge in the initiation and actualization of innovation in these institutions.

Perceptions of the participants in my study reveal that without a well executed implementation strategy, policies on new technologies in teacher education do not necessarily change pedagogy, especially if they are not accompanied by measures that stimulate and encourage such change both in teacher education programmes and also in schools. Some studies are in agreement that levels of innovation should be met with adequate strategic planning and infrastructural support. For example, Mioduser et al (2002), in a study conducted in Israel came up with three levels of innovation in schools; assimilation, where specific pedagogical situations change qualitatively, but the school curriculum as a whole remains unchanged; transition, where ICT supports the integration, within the school's everyday functioning, of new contents, didactic solutions, and organizational solutions side-by-side with the traditional ones and transformation, where substantive changes take place in the school system as a whole.

Participants in the Case programmes revealed that whereas these stages may not have been anticipated in the national policy and strategy documents, a number of elements in the school remained at the assimilation level or the early adoption phase (Roger, 2003). A number of traditional school structures and beliefs, which are discussed in Section 8.3 tended to remain the same (See: Oliver and Dempster, 2003).

The findings in this section indeed concur with those of another study of factors affecting the successful implementation of ICT projects in government in Kenya (Gachioya, 2005). The study outlines the characteristics of the Kenyan ICT

environment as shown in Figure 12 below. In similar studies, lack of planning for ICT implementation has been blamed for implementation problems witnessed in developing country contexts. Planning can help reduce waste by identifying the prerequisite conditions for successful ICT implementation. Though developing countries commit a sizeable amount of economic resources to ICT, for them to reap maximum benefits, ICT needs careful planning and coordination prior to implementation. Otherwise trial and error methods of implementation that characterize most government ICT applications will only succeed in the wastage of scarce resources (Maciaszek, 2001; Harindranath, 1993)

- Most ICT projects are initially donor funded
- Some donations are made without prior consultation or carrying out a needs analysis by the recipient organization.
- Operational/running costs are met by the government. Funding (capital and human resource requirements) ends with the project phase.
- The budgets for ICT are inadequate but rising.
- A lack of ICT policies and master plans to guide investment, to the extent that, with a number donors funding ICT, there have been multiple investments for the same product due to lack of coordination.
- Focus on ICT applications that support traditional administrative and functional transactions rather than on effective information processing and distribution within and without government departments
- Unstable ICT resources

Figure 12: Characteristics of the Kenyan ICT environment *(Adapted from:* Gachioya, 2005: p176)

The key points arising from this section are:

- Whereas technology and implementation plans are considered important in ICT infrastructure investments, none of the Case institutions had any implementation plans, leading to sporadic training approaches in different programmes.

- Evidence of inter-tier disjunction is manifested by the fact that none of the Case institutions had an institutional strategic plan despite the existence of a national strategy for education and training at the time of the study.

- Teachers and teacher educators understood the general requirement for ICT in education. However, there was variability and discretion in understanding of the anticipated outcomes of ICT training among teachers, pre-service teachers and teacher educators.

- There was general lack of strategies to deal with implementation dip in all 3 Case programmes. The implementation dip resulted from inadequate knowledge and training among the teachers and teacher educators in the ways to use technology for their own training and also their classroom teaching

- The skills and competencies to which the teachers were exposed were not sufficient to trigger a change in the overall pedagogic practice in the institutions where the teachers worked.

8.2.3 Educational structures, beliefs and practices

In this section, I discuss evidence drawn from the participants in all 3 Case institutions that reflect their perceptions of the transformative potential of ICT as witnessed both in their own ICT training and their classroom practice as a result of the training they received. I attempt to analyse perceptions of the teachers in my study of ways in which they felt that the ICT training that they had undergone had changed or was likely to change practice at the institutions in which they taught.

In Case 2, which was an on-campus teacher training institution, I draw from responses given by the ICT lecturers, and other teacher educators on their perceptions of national ICT curriculum implementation and the possible influence that this is likely to have on the teaching of subjects across the curriculum. I also refer to the few experiences of the teacher educators who had undergone some ICT training or related programmes and whether they felt this had changed the way they conducted their subject teaching.

It was apparent that in the early adoption phase of ICT implementation, a number of teachers and teacher educators in all three Case programmes tended to replicate traditional classroom routines and structures. Some participants felt that they had made great strides in ICT use in their classrooms by downloading information from the Internet, printing this out and making it available to the students in the form of notes. This kind of practice demonstrated that the teachers still held the traditional beliefs about teaching where they were the sources of knowledge.

The routines that were already firmly rooted in the school system therefore seemed to stay the same and these included time-tabling, timed lessons, and high stakes sit-in examinations across the curriculum. The main intention behind the

use and integration of ICT in teaching and learning is often to change how teaching and learning are conducted in the sense of putting more emphasis on interaction, flexibility and innovation (Bates 2000). This intention, even though well articulated in some parts of the policy documentation reviewed, was not interpreted and practiced as intended.

My study suggests that teacher educators' practices mediated by ICT in Case 2 institutions had undergone minimal or no change despite the introduction of ICT as an in-house course in many colleges in 2002, and later on the inclusion of ICT as a teaching subject in the PTE curriculum since the year 2004. This seemed to be caused by the perception at the Case 2 institutions that ICT was a separate subject in the curriculum that was taught in turns to different groups of students in the computer lab. The link between this subject and the teacher educators' own teaching subjects was unclear.

These findings are consistent with a number of studies that have been undertaken to investigate the reason behind the lack of impact of ICT in education despite the large investment on ICT infrastructure (See: Conlon and Simpson, 2003; Cuban, 2001; Norris, Sullivan, Poirot, and Soloway, 2003). The dominating perspective underpinning these studies was the expectation of change. For example, a number of studies in both developed and developing countries suggest that even though significant investment had gone into equipping schools and teacher training institutions with ICT infrastructure, ICT was yet to impact on teaching and learning (Stensaker, 2007). My findings also concur with Cuban's (1993) argument that there is the tendency of technologies to reinforce what schools have done over a century.

Some studies in countries where ICT use has permeated the curriculum suggest that there have been few signs of radical alteration to existing structures and working practices, or even evidence of particularly innovative application of ICT to enhance and extend learning (Tearle, 2003). Others suggest that while effective use of ICT in teaching subjects across the curriculum is increasing, good practice remains uncommon (Watson, 2001).

Owing to the high-stakes examination system in Kenya, a majority of teachers and teacher educators in my study still found the text book a more reliable companion in their teaching as opposed to the computer, internet and related resources. This was a pointer to lack of coordination and disjunction at Tier 2 since eLearning had been provided for in the ICT policy yet the requisite digital content that supports the national curriculum had not been made available in a format that would have encouraged the use of these resources by the teachers. Besides, the computer was looked at as a subject in the curriculum (ICT or Computer Studies) that a student needed to pass in order to fulfil certain vocational expectations, just like the other subjects in the curriculum. In one of the Case 1 institutions, ICT was seen as an add-on resource that the teachers only used for follow-on lessons for sections that they had already taught in class. The lab was therefore in effect just one other classroom and this is not what had been anticipated in the programme strategy (See: Chapter 7).

Still, in Case 1, the curriculum that the ICT Champions had been offered lay emphasis on ICT-pedagogy integration. Since the programme had adopted a cascade model of training, the Champions had a responsibility to train the remainder of the teachers by passing on to them the same skills that they had attained. The teachers back in the schools were, on the converse, taken through a

skills training on the productivity programmes and the emphasis in the school based training therefore shifted. This disjunction was caused by the method used to select the Champions:

> The Champions were teachers who already had the ICT skills, unlike the other colleagues back at school. It was difficult to get the teachers to appreciate ICT integration when they felt so uncertain with regards to their ICT skills (deputy principal: C1.1-N4).

The context in school did not, therefore, lend itself to a smooth transfer of information since the skills were understood to be necessary for enhancing the face-to-face teaching rather than introducing new ways of teaching just as evidenced in the following source as well:

> In theory, the benefits to the first group will be identical to the benefits to the last group; in practice this smooth transference is rarely possible. The hallmark of any good instruction is that the materials and methodology are finely tuned to the learners. With the cascade, the audience is constantly changing from level to level and this poses a serious problem for the design of the package (McDevitt, 1998: 426).

Some teachers in Case 1, where ICT integration with the subjects was encouraged in school, still taught their lessons in the computer labs and physically attended all classes in the computer laboratory even when the classes were referred to as 'research' lessons. The practices within the computer lab were therefore the same as those of an ordinary classroom, as suggested by one respondent:

> It is difficult for me to know whether my students are visiting the educational websites that I have recommended for them or straying into social networking web sites, which is not part of the curriculum, and therefore wasting valuable learning time. So I restrict the web sites that they visit and stay with them for the research lesson in the computer lab (teacher of computer studies: C1.2-N15).

This potential of the internet to give users access to vast and varied quantities of information apparently threatens the traditional expectation that teachers need to subject this information to quality control with regards to compliance with the

curriculum. In some studies, schools and education systems were seen as sites for both strong classification and strong framing of knowledge, which are fundamentally challenged by the destabilizing impact of ICT on concepts like knowledge, teaching, the disciplines and rationality (Somekh 2007; Cuban 1993). Gamoran (2001) talks about the 'stable structure' of the school and the 'persisting process' of classroom organization and pedagogy. Other studies also suggest that when ICT affronts deeply embedded assumptions about the interaction of education, power, culture, and society, then conflict may arise between 'those who make policy happen and those who resist it' (Tearle,2003: p301). The resistance to change comes mostly from teachers for whom the policy has the greatest impact (Somekh, 2007: Sharples, 2003).

A final issue was the expectation in the ICT policy statements of changes to teaching in line with constructivist and socio-constructivist approaches to teaching and learning. Whereas the ICT policy documents analysed in my study did not explicitly mention 'constructivism' as a guiding principle for teaching and teacher education, some attributes of constructivism were emphasised in the ICT policies, particularly learner-centred collaborative approaches to teaching and learning (Republic of Kenya, 2005:p80).

This study revealed that teachers and stakeholders generally remained unclear about the expectation of the national policies on classroom approaches, and teacher-centred approaches. Other teaching-learning activities that are consistent with the behaviourist paradigm were prevalent in the teacher education institutions and schools visited as discussed elsewhere in this sub-section. The use of constructivism as a measure of change in teaching practice with ICT is prevalent in the literature (Sharples, 2003). Some studies, however, indicate that while most

teachers' practices with ICT have not changed to constructivist ways of teaching, it cannot be assumed that they are not changing at all (Orlando, 2009). Such change was witnessed in the perception of the Internet not as an entertainment medium but a key learning resource in Case 1 institutions.

My findings, in line with the studies highlighted above, suggest that there has been institutionalized resistance to the radical changes that ICT implementation calls for, especially on the pedagogy in teacher education programmes and also in educational institutions in Kenya. ICTs, by their very nature, seem to have the potential to disrupt ordinary routine procedures of schooling and challenge some of the basic principles which it symbolically upholds, hence the resistance that it attracts. This is evidenced in the manner in which teachers keep with the tradition of teacher-centred learning, even in the computer laboratories where there is Internet access and the lessons have been designated as 'research lessons'.

Teachers and teacher educators in my study did not seem to be aware of the ways in which ICT implementation at their institutions, including their training programme, was intended to change their practice. Hence, in a context where the teacher educator or a teacher had a choice between keeping with the old pedagogies and using ICT to embrace a new approach, there seemed to emerge a compromise, which in most cases involved using ICTs in ways that did not necessarily reflect a radical change in pedagogy. Other than the investment on ICT infrastructure, therefore, the structures, practices and beliefs in Tier 4 institutions largely remained the same in spite of the intensified ICT policy activity related to teacher education at the other Tiers during the later years of the study period.

The key points arising from this section are as follows:

- There was minimal or no change in the teachers' practice with ICT after the training. Even after ICT training, the practices that teachers involved in were predominantly Type I practices. Lack of Internet access was a main contributor to this trend.

- Where teachers believed that their classroom practice had changed, it was not in ways that exhibited the kind of innovative practices expected in a Type II ICT implementation, where aspects of classroom interaction would have exhibited a change in value. There was little evidence of ICT being used to support the students' ability to become, for instance, independent learners. Instead, teacher continued to be the source of knowledge and the students, passive learners.

- The routines and structures in schools remained the same and ICT only seemed to help reinforce these routines (Cuban, 1993).

- There seemed to be a general institutionalized resistance to the changes that ICT implementation called for. The existence of high-stakes examinations was one key cause of resistance, where the ICT content was seen not to support it.

- Lack of cross-tier coordination was responsible for the unawareness among teachers and teacher educators of the ways in which ICT training was supposed to change their own practice.

8.3 Conclusion

From my study, it emerged that there were discrepancies between ICT policy development and ICT policy implementation in teacher education and in education in general in Kenya. Whereas teachers felt left out in the ICT policy development process, the implementation of policy, undoubtedly, posed great demands on them in terms of knowledge, skills, attitudes and competencies which were not entirely anticipated in the policy documents. Teachers and teacher educators attempted to meet these demands through subjective interpretation or re-creation of policy. This produced versions of implemented policy that were created from personal frames of reference which resulted in a variety of interpretation of the ICT policy in teacher education.

Since the ICT policy making process in Kenya had largely been centralized during the study period, the split between development and implementation of policy had created a direct top-down conception of the ICT policy process captured in the 4-Tier framework. Teachers and teacher educators appeared to be disconnected policy receivers, 'absorbing implementers to deliver the goods, excluded from the generation or the production of policy' (Bowe and Ball, 1992:p7). ICT policy in teacher education was therefore filtered and those parts that 'fitted' with teachers' personal perspectives, needs and intuition were selected and acted upon, as demonstrated in the implementation approaches adopted by teachers in the Cases 1 and 3 cascade teacher training programme.

The existing configuration of computer hardware, alongside pre-existing knowledge, attitudes, and behaviour determined the meaning that teachers made of the national ICT polices and the actual implementation approaches. Teachers tended to keep with the traditional approaches to teaching and learning both in

their own learning of ICT, in the way in which they trained one another, how they taught their students and also in the way that they trained the pre-service teachers. Characteristics of Type I implementation therefore remained predominant, as opposed to Type II.

The tridimensional understanding of the place of ICT policy in teacher education as evidenced in Section 8.1 was evidently quite vague to the institution administrators, teachers and teacher educators where teacher education programmes were offered. There was more focus on implementing ICT policy in teacher education with ICT as a teaching subject and as a generic skill involving knowledge and use of the productivity programmes (Type I). The third dimension, which involved use of ICT as an integrated component of the teaching-learning process (Type II) called for additional competencies in the knowledge base and skills both of the teachers and the teacher educators. This seemed difficult to achieve not only in the training models adapted in Cases 1 and 3, but also with the addition of ICT integration as a topic in a curriculum that otherwise offered generic ICT skills to the pre-service teachers in Case 2.

It can be concluded, therefore, that there was evidence of ICT policy discourse stratification in the 4-Tier policy development and implementation process. The policy discourse that occurred at Tiers 1 and 2 of the ICT policy development and implementation process, for instance, became a different discourse further down the implementation hierarchy, and the understandings and expected outcomes were different. ICT policy as text, as conceptualised in Tiers 1 and 2 was, therefore, not necessarily the policy in action in Tiers 3 and 4. Whereas the teachers and teacher educators in my study did in many instances indicate that they were aware of the national ICT policies, none of them had read the national

ICT policies, neither did their institutions have institutional policies and implementation strategies. This general policy discourse disjunction in a highly stratified policy process can be said to be responsible for the variation in the interpretation of the national ICT policies in teacher education, and therefore the slow pace of transformation in teacher education in Kenya.

The non-linearity between the policy objectives and action at the institutions arose out of lack of a clear and consistent statement of the policy intention with regards to the place of ICT in teacher education in Kenya. The understanding of ICT as a subject, a general skill and a competency needed by a teacher for innovative pedagogy remained obscure both in the policy statements and also in actual practice, resulting in a policy-practice disjunction. It emerges from this study that even when teachers 'believed' that their training in the teacher education programme had changed their classroom practice with ICT, the actual classroom practice that they described did not necessarily reflect any change of value into Type II characteristics.

These contribute towards the key finding in my study, which is that the policy discourse stratification in the ICT policy development and implementation process in teacher education system in Kenya was responsible for the slow pace of change in practice in teacher education programmes and also in schools in Kenya. The lack of co-ordination within and between Tiers resulted in a raft of practices that portrayed different understandings and interpretations of the policy statements.

CHAPTER NINE: OVERVIEW OF THE STUDY AND DIRECTIONS FOR FUTURE RESEARCH

Introduction

This chapter, in 5 sections, draws together the main conclusions which emerge from the study and the recommendations for ICT policy development, practice and research in teacher education. In the first section, I summarise the main research findings in response to the research questions posed in earlier chapters and look at what these mean in terms of developing an understanding of the ICT policy development and practice in teacher education programmes in Kenya. The second section of the chapter draws on the findings of this study to propose some basic principles which might underpin ICT policy development and implementation process in teacher education in particular and education in general. The third section draws on this study to identify possible drivers for change in ICT implementation in teacher education in Kenya and the Sub Saharan Africa. The fourth section summarises the contribution that my study makes to research in ICT policy making for and practice in teacher education. The final section proposes some areas for further research.

9.1 The major findings of this study

This study aimed to examine national ICT policy development and practices in teacher education programmes in Kenya, and establish the extent to which practices in teacher education demonstrate agreement or otherwise, with these policies. A wide range of data sources were used in the study.

In looking at ICT policy development and implementation process in this way, it was hoped the study would give a clear picture of the ICT policy evolution in Kenya and outline the policy-practice relationship in the context of teacher education. The study would also identify some of the inter- and intra-tier tensions were evident in a decision-making process that emerged as highly centralised and stratified.

Addressing the main research question

This study's main research question seeks to establish the extent to which national ICT policies have influenced policy and practice in teacher education in Kenya. The study did not assume a causal link between policy and practice but drew parallels and possible relationships where the publication of a policy document at a given time and in the context of a chronology of activities, would justify a possible link. Possible influences, other than the national ICT policies, on practice in teacher education programmes were also considered.

Elsewhere in this thesis, I have described and analysed the data arising from documentary analysis, interviews with key stakeholders and also the 3 case studies. I have focused on the characteristics of the ICT policies that evolved since independence in the mid-60s till the year 2007. I have also discussed

understandings of ICT policy priorities in teacher education and practices in teacher education programmes as exemplified in the 3 case studies.

From my analysis, I suggest some practices are informed by the understandings of ICT priorities in the policy documents while others are outcomes of subjective interpretation of the role of ICT by the teachers and other players in the implementing institutions. I have particularly focused on the curriculum, training and capacity building in teacher education programmes, and also the challenges in ICT policy implementation in the various programmes. Finally, I have looked at policy implementation against a backdrop of routinised practices, structures and beliefs in the education sector.

In this chapter, I suggest what this analysis means in terms of our understanding of ICT policy development and practices in teacher education in Kenya.

The evidence presented in this thesis suggests that there was an entirely top-down policy conceptualisation in the development and implementation of ICT in teacher education programmes in Kenya, with much evidence of international influences on this process. ICT policies of relevance to teacher education were often developed by government institutions or their appointed agents in a fragmented policy making setting that situated ICT policy making on several policy making organs. Official national policies were developed at the top within Tiers 1 and 2, and then passed down for implementation at Tier 4, with some coordination by Tier 3.

This created a highly stratified policy making environment where decision making in ICTs in teacher education was concentrated on the higher tiers of the policy making framework, and often spread across several policy documents.

Participation of teachers and the Tier 4 institutional leadership in the decision making process remained minimal. Teachers, teacher educators and institutional leaders tended to subjectively interpret the ICT policy provisions, leading to approximations of an emerging tri-dimensional understanding of the place of ICT in teacher education in Kenya; ICT as a subject, ICT as a skill and ICT for pedagogic practice.

The following 7 key findings emerge from the study:

- That ICT policy in teacher education was part of a wider social and political context, linking to various structures of authority both within Kenya and in external international contexts. In Africa, the Tier 1 international supra-institutions like the African Union (AU), NEPAD, donors, international partners and the state were parallel and interrelated sources of national policy. This resulted in a centralized, hierarchical and bureaucratic decision making process where government Ministries and other related government-level institutions were the main sources of policies in education, giving rise to a predominantly top-down implementation model.

- That national policies in Kenya were often typically promulgated through formal statements which were then passed down to the next hierarchical level for implementation. The provisions of these policies tended to be recontextualised through various subjective interpretations of the policy by teachers, educational leaders such as institution Principals and other actors in the implementation hierarchy.

- Furthermore, implementation of ICT in Tier 4 was predominantly of Type I, even when the ICT policies expected Type II outcomes. This was a result of

the space .configuration in schools that encouraged Type I practices with ICT (Tubin, 2006; Cuban 1993).

- That the hallmarks of hyperationalisation and wishful thinking were evident in the study; outcomes anticipated in the policy texts were frequently not the outcomes witnessed in practice – Tier 4. There was a lack of understanding by players in the higher Tiers of the general knowledge base and competencies desired of teachers to implement an ICT integrated curriculum, leading to inter-tier policy discourse disjunction and a general inability by teachers to implement policy provisions.

- That, as an outcome of this disjunction, the skills and competencies to which the teachers were exposed in the training programmes were not sufficient to trigger a change in the overall pedagogic practice in the institutions where the teachers worked and also in institutions where teachers were trained. Understandings of the priority role of ICT hardware, software and the Internet in teacher education influenced the form and content and also the training model of the ICT training for teachers and the teacher educators in all 3 case programmes.

- That the teachers and teacher educators generally seemed to be disoriented by the availability of new technologies in their institutions and seemed to lack adequate training and knowledge in the technologies both to enable them access professional development material and also to teach their subjects, resulting in an implementation dip within the case institutions. There were no strategies to anticipate and deal with the implementation dip.

- That the tendency of education to preserve itself in existing forms despite new technologies was evident in my study (Cuban, 1993). There was a general lack of awareness of the transformative potential of ICT in education. The routines and structures in schools remained the same despite teacher training in ICT. Even when teachers 'believed' that their training in ICT had changed their classroom practice with ICT, the actual classroom practice that they described did not necessarily reflect fundamental value changes in the role of the teacher, student and teaching methods. This may be attributed to a lack of change knowledge, which is an important component of the educational improvement pillars of change, technology and pedagogy. Change knowledge is defined as understanding and insight about the process of change and key drivers that make for successful change in practice (Fullan, 2004).

- That isolated evidence of backward mapping existed in my study especially where the proliferation of computers created the need for national policy.

I find it possible to speculate that the policy making environment for ICT in teacher education in Kenya is an example of what Elmore (1979) calls the 'noble lie' of public administration, where it is assumed that authority over implementation, in a forward mapping approach, proceeds from the top and moves downwards through the policy system. This top-down formulation, however, happens to be the foundation for most efforts to ensure successful educational policy implementation in Kenya, with the focus remaining on issuing more explicit policy directives, giving greater attention to the allocation of responsibilities and providing clearer statements from the top of policymakers' intended outcomes as a means of controlling behaviour throughout the education policy system.

The findings in this study support Elmore's theoretical proposition, that despite the hierarchical lines of command and control to ensure implementation and compliance with national ICT policy, discretion prevailed at Tier 4 institutions. Putting into consideration the institutional and individual needs as interpreted within this Tier in a backward mapping approach would increase ownership of the policy propositions and improve the chances of transformational practice that might result in the changes anticipated in the policy statements.

These findings are also in agreement with Fullan's conceptualization of policy as what happens in practice (as opposed to what is stated on policy texts), the nature and extent of actual change as well as on the factors and processes that influence how and what changes are achieved (Fullan, 2001). The nature and extent of actual change, particularly with regards to the way in which teachers in the Case programmes were trained and also the manner in which they taught after having been trained in ICT, were not in ways that were immediately discernible in the policy statements. Fullan contends that the relationship between behavioural and belief change is reciprocal and ongoing, with change in doing or behaviour a necessary experience on the way to breakthroughs in meaning and understanding.

Closely related to this is Cuban's contention that teachers' use of computers and other forms of technology have effectively been seen as important but peripheral helpers to the main business of teaching students. Even though Cuban wrote several years ago, his observation that teachers adapt the new technological tools to help students be more productive and do a better job of what they have always done in schools is highly evident in this study. New technologies did not therefore automatically translate to transformative Type II practices among teachers. They

instead reinforced what schools have done before and the structures, beliefs, practices in schools have persisted despite the introduction of computers in schools and training institutions in Kenya. This situation has also been witnessed in other parts of Africa (Farrell and Isaacs, 2007; SchoolNet, 2004).

Even though this was not a direct focus of my study, it emerged that the use of mobile devices in education had not taken root in Kenya, in spite of the fact that mobile phone ownership had increased significantly (See: Chapter 1). Despite the fact that many young people own mobile phones in Kenya, it appears that these young people did not have direct channels of influencing ICT policy in education.

9.2 Implications for ICT policy development and practice in teacher education

Having comprehensively looked at the ICT policy evolution process in Kenya since independence, carried out interviews with key persons and conducted 3 Case studies, there is still a need to be cautious and tentative in making general claims regarding the ICT policy development and practice in teacher education in Kenya. However, the centralised policy making process is the norm in Kenya as documented in some studies (Ong'ondo, 2009; Jwan, 2009; KIPPRA, 2007) and therefore the implications of this study readily find relevance in the educational policy development and implementation context in Kenya.

First, the findings indicate that international influences have a great bearing on the national ICT policy trends. It is apparent that national ICT policy development is increasingly taking place in a scenario where globalization and related cross-national convergences seem to determine the prospects for an otherwise traditional education system in general and teacher education in particular, with new global policy rhetoric and approaches emerging and finding their way into the

ICT policy statements. Prescriptions and initiatives by international agencies like the World Bank, IMF, USAID, COMESA and AISI in determining ICT policy development in Kenya had influences in the education sector in the various phases discussed in this thesis. These Tier 1 influences, however, have not led to teachers owning the policy prescriptions that come with them. I suggest that teachers, teacher educators, institutional leaders and other teacher union bodies be involved more in the decisions that are eventually worked into the teacher training curriculum and the overall national curriculum. This will reduce the inter-tier policy discourse disjunction and lack of ownership witnessed in this study.

Second, there is discordance between the policy intentions as expressed in the national ICT policy statements on teacher education and the actual practices in teacher education in the Case programmes. The centralised policy making process is marred by hyperationalisation and wishful thinking (Wise, 1980). In spite of the ICT training that the teachers and teacher educators undergo, the anticipated change in teaching practice in the schools and teacher education programmes has not been achieved. Teachers continue to widely use teacher-centred approaches to teaching and there are no other platforms for interaction with learners other than the face-to-face context. Therefore, there is need to identify the competencies and needs of the teachers in a backward mapping approach (Elmore, 1979) to allow for consensus building on the role of ICT in the teacher education curriculum and also on the overall educational curriculum.

As Fiorino (1997) points out, particular advantages of backward mapping that have been observed include the fact that; it brings the affected stakeholders into the process of designing and implementing reforms; it proceeds incrementally to build a consensus for change based on experience with small scale policy

modifications; and, finally, it leads to proposals allowing for more discretion and flexibility at the ground level. Over time, the backward mapping strategy may yield more widespread systemic changes in ICT implementation in teacher education.

Third, despite the existence of various policy themes as seen in the documentary analysis, the study has found that both the policy statements and the teacher education programmes gave priority to ICT infrastructure acquisition, which in turn did not facilitate any innovative practices depicting transformative pedagogy. The configuration of the computer hardware in education institutions, alongside pre-existing knowledge, attitudes, and behaviour influenced the implementation of ICT in teacher education and in schools. Teachers and teacher educators tended to keep with the traditional approaches to teaching and learning in their own learning of ICT, in the way in which they trained one another, how they taught their students and also in the way that they trained the pre-service teachers.

There is need to focus on other ICT policy themes that encourage Type II practices if educational improvement is to be realised (Tubin, 2006; Fullan, 2004). Other themes like digital content, ICT integration in teacher education and also ICT for research in teacher education need more attention in the course of ICT implementation in teacher education. The availability of digital content that is of direct relevance to the national curriculum will encourage teachers to use ICT in their classrooms and ICT integrated pedagogy would then begin to be a reality in Kenyan classrooms.

Finally, this study has found that setting the goals and stating guidelines at national level do not necessarily guarantee desirable effects in the lower implementation Tiers. The Ministry of Education should, during policy development, anticipate problems associated with implementation, especially

implementation dip, possible resistance to policies on new technologies and the likelihood of teachers not using computers to realise their full transformative potential in the school setting. When planning any major changes in teacher education and the education sector in general, the upper Tiers in the decision making hierarchy should dialogue with those who will actually implement the changes - the teachers, teacher educators and institutional leaders. Orlando (2009) proposes that one of the ways in which to deal with the implementation dip is to provide clear strategies that target the social, cultural and institutional dimensions of ICT. I propose that the KIE and other related bodies give teachers clearer guidelines during the orientation programmes for teachers as they develop new habits during the implementation dip.

9.3 Drivers for change in ICT policy implementation in teacher education

Evidence drawn from this study suggests there are indeed many challenges to ICT implementation in education in Kenya specifically, and in Africa in general. One of the challenges is in realising the promise of a transformed education through ICT. Evidence drawn from the research literature and data in this study indicates that many governments and education institutions in Africa aim, in their policies, at the ideal ICT implementation approach, Type II. Type I practices are, however, more prevalent.

Type I implementation approaches occur in educational institutions when innovation decisions are adopted by staff and students, but the routines around the domains of teachers' roles, teaching methods and time and space configuration remain the same. This type of implementation ensures that the teachers and students continue to interact in the traditional way, with ICT only

serving to make traditional routines faster and easier. Type II implementation, on the other hand, results in better and transformative ways of teaching and learning that can only be possible with technology. They encourage greater autonomy among students and teachers, encourages learner-centred learning and provides flexible means of interaction between the teacher and the student, and among students.

This study reveals that the drive to change educational practice and attain a transformed learning and teaching environment begins with policies and initiatives, often influenced by certain extraneous drivers of change. One such driver for change is the donor community. Indications in my study suggest that donor aid has had a big impact on national ICT policies both in Kenya and in Africa in general. Whereas there is evidence in the research literature that donor countries have often used international assistance to advance their own interests in developing countries, my study shows that there have been a number of successful donor-supported teacher development programmes like the SbTD, SPRED and PRISM (See: Chapter 2). Even though it has been the case that many countries in Africa often change internal policies to meet donor conditions, the outcomes of donor-supported teacher education programmes in Kenya have received favourable evaluations (See: Chapter 2). The interest of donor organisations in use of new ICTs in teacher education led to some early initiatives that focused on building the capacity of teachers in primary schools and improving their skills through the use of technologies. The donor influence in the education sector in Kenya led to the elimination of untrained primary school teachers by the year 1994 through intensive and sustained in-service teacher training programmes. Other such programmes have included initiatives in institution management.

Another driver for change in relation to ICT in education is the influence from regional bodies. A number of teacher education initiatives have been supported or linked to regional and Pan-African institutions like NEPAD e-Africa Commission, which has the mandate to influence ICT policy within individual member countries. Other regional bodies like South African Development Community (SADC), Regional ICT Support Programme (RICTSP), the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA) and the Inter-Governmental Authority for Development (IGAD) have significantly influenced ICT policy making and implementation in a number of member countries. The influences of these Tier 1 institutions are targeted at individual governments who then cascade the implementation to levels in the lower Tiers.

Based on the evidence drawn from one of the Case programmes in this study that was directly supported by the Pan African organisation, NEPAD, the practices with ICT witnessed in the teacher training and teaching within Tier 4 institutions did not exhibit the transformative practices expected of Type II ICT implementation processes. The conclusion is that these Tier 1 institutions tend to focus on the wider issues of policy formulation and regional integration, and are also often quick in providing ICT infrastructure to educational institutions. The potential implementers, the teachers, have often not appreciated their locus within the educational improvement pillars: change, technology and pedagogy.

The state and the government also emerge as drivers for change in ICT implementation in several countries across Africa. The discourse emerging from top African leaders like Kofi Annan and Nelson Mandela (See: Chapter 1) that directly links ICT to the possible solutions to illiteracy, hunger and poverty in Africa is an indication that the political will to improve the livelihoods of Africans

through appropriate ICT policies is strong. However, my study has shown that the centralised ICT policy making in Kenya, and indeed in Africa, has the hallmarks of hyperationalisation, making it difficult for educational institutions to meet the goals set out in the policies.

Owing to hyperationalised policies, teachers and teacher educators are confronted with technologies without any indication of the kind of change that they should aim at in using technology. Consequently, teachers settle for practices with ICT and adopt innovation decisions that do not necessarily result in change of routines. The teachers and teacher educators' knowledge of innovation is limited. To minimise the effects of hyperationalisation, education practitioners have the challenge of improving upon capacity building programmes to include a change knowledge component (Fullan, 2004). This will potentially forestall some characteristics of implementation dip and ensure that the drawbacks associated with the initial stages of ICT implementation are minimised.

Finally, the 'technology paradox' is a key theme in my study. This is especially in relation to the increasing number of school going youth who are ICT savvy, have ready access to ICT and have changing learner characteristics. A young generation is emerging in Africa that is immersed in technology, particularly as an outcome of the popularity of social networking sites. This places new demands on teacher preparation in Kenya. Educators have the challenge of not only learning the technology but keeping up with the new technologies as they evolve. In Kenya, computers are increasingly becoming available to the urban youth and those from some rural and peri-urban areas as a result of government initiatives such as the Pasha Centres. This study shows that many countries in Africa, including Kenya, have provided the requisite ICT infrastructure in teacher education and other

educational institutions, but this investment has not yielded a change in the teacher and learner roles. The study indicates that teacher preparation for students in this generation need to include a knowledge base that enables the teacher to apply technology tools appropriately in order to process and meet the diverse needs of these students in terms of the level of interactivity desired, sources of information and collaborative learning experiences. This way, classrooms in Africa will realise more Type II practices, and reap the benefits of transformative education.

9.4 Contribution to research in ICT policies in teacher education

Based on my knowledge of the context of the study, the literature review and my analysis of the data, my study makes important contributions to knowledge in the field of ICT policy development and implementation in teacher education in particular and in education in general. I have outlined most of these contributions in the analysis and discussion chapter and I will only highlight the key ones in this section.

First, despite an exhaustive search in online databases and the libraries that were accessible to me during the study, I did not find any study on ICT policy development and implementation in teacher education in Kenya. Studies on the general ICT policy process with a focus on the role of government, private sector and civil society in Kenya exist, among which are a series of articles is an edited book (Etta and Elder, 2005) and some journal articles (Bowman, 2010). I have also come across a recent PhD documenting pedagogical practice and support for English Language student teachers during practicum in Kenya (Ong'ondo, 2009) and a Master's thesis that evaluates the usage of the available ICT facilities in the Kenyan public primary teacher colleges, with a focus on the quantity of computer use and the levels attained in terms of using ICTs to support, expand and transform teaching and learning (Oreo, 2008).

No study, to my knowledge, has looked at ICT policies and practices in teacher education. My study is therefore the first study that documents the evolution of ICT policies related to teacher education and contributes empirical evidence conceptualised around the characteristics of the 4-Tier policy development and

implementation framework, that would be useful in the development and implementation of ICT policies specific to teacher education in Kenya.

Secondly, it is evident from my study that the policy discourse disjunction and stratification in the 4-Tier ICT policy development and implementation framework in teacher education context in Kenya was responsible for the slow pace of change in practice in teacher education programmes and also in schools in Kenya. The lack of co-ordination within and between tiers resulted in varied practices that portrayed different understandings and interpretations of the policy statements on the place of ICT in teacher education and education in general. ICT policy as text was not necessarily policy in action as evidenced in the Case programmes. My study, therefore, contributes substantive empirical evidence that should be considered in the on-going discourse on curriculum reform through ICT integration in education in Kenya.

Third, in terms of methodology, my study is a qualitative historical interpretive study that draws data from a comprehensive and chronological documentary analysis, interviews with key stakeholders and 3 case studies. This not only provides a holistic approach to the phenomenon of policy development and implementation, but also provides the requisite data source triangulation that has enhanced trustworthiness in my study (Yin, 2003). The study also adds to the few educational studies of the Kenyan context in the recent past that have demonstrated the value of qualitative research in a context where quantitative surveys are more of the norm than qualitative studies (Ong'ondo, 2009; Jwan, 2009).

Finally, my literature review revealed that despite there being increasing activity in ICTs in education in Africa, there were very few publications available on ICT

policies in teacher education, as compared to the North. My study is therefore an important addition to the discourse on ICT policy development and implementation in Africa and other developing country contexts.

9.5 Suggestions for further research

I would like to propose a number of areas for further empirical investigation, based on the issues that have arisen from my study. First, my study focused on policy documents that were published after independence until the year 2007, and isolated for analysis, those policies that may have been of relevance to teacher education. I would suggest a closer look at policies published in the post-2007 era to establish where the policy focus is in terms of ICT in education, especially with the landing in Kenya of the under-sea fibre optic cable and the on-going laying of the national fibre-optic backbone, that is likely to drastically reduce the Internet access costs for learning institutions.

Second, I would propose a study that looks closely at ICT integration in teacher education in higher education institutions. Whereas the interview data yielded some general information on this aspect, an in-depth study on practices in specific higher education institutions would help check the consistency of the findings in my case studies, especially in relation to the Type I and Type II ICT implementation processes (Tubin, 2006). Such a study would explore the perspectives of student teachers in higher education institutions on how they view their preparedness to use ICT in their teaching upon completion of their courses.

Third, I would suggest a study on some of the issues which arose during my study but were clearly not within the scope of my study. These include: the extent to

which each of the 8 ICT in education policy themes identified had been interpreted and implemented in various contexts; the impact of digital content on the attainment of objectives of the national curriculum; the relationship between institutional leadership qualities and uptake of ICT in particular institutions; and also teacher perceptions of eLearning. These are worth exploring and would contribute further knowledge in the field of ICTs in education.

Finally, I would suggest a replication of this study in other contexts, especially developing country contexts. I acknowledge that the documentary analysis in my study covered a rather long period but yielded plenty of data. Whereas this is comprehensive and has added depth to my study, its analysis was quite demanding. I would propose an analysis of ICT and related policy documents within limited periods of time, against practices in the corresponding period.

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APPENDICES

APPENDIX ONE: Role of committees and panels at KIE

The Academic Committee is appointed to represent the Ministries responsible for education, higher education, science and technology, the Kenya National Examinations Council; the Commission for Higher Education; the Kenya Institute of special Education; and the schools of Education in a public and a private university respectively. The Academic Committee may establish its own rules of procedure and shall submit the proceedings of its meetings to the Council for approval The Committee may co-opt other persons whose knowledge and experience it may find necessary for the performance of its functions, which is to:

(a) keep under constant review the curricula at different levels of education and training as *provided for in paragraph*

(b) oversee the quality of educational programmes developed by the Institute

(c) coordinate and guide the activities of subject and course panels appointed under paragraph 13;

(d) review broad issues relating to curriculum and education policy and make recommendations to the Council; and

(e) approve all educational programmes developed at the Institute on the behalf of the Council.

.

The functions of a **course panel** is to:

(a) examine the curriculum in a broad educational area;

(b) keep the relevant course under constant review and make recommendations to the Academic Committee;

(c) coordinate and guide the activities of the Subject Panels; and

(d) where applicable, liaise with other institutions and agencies involved in human resource development.

The functions of a Subject Panel shall be to:

(a) initiate and guide appropriate curriculum development activities in the relevant subject;

(b) keep the existing syllabuses in a subject or curriculum area under constant review and make recommendations to the Course Panel;

(c) review teaching and learning materials and make recommendations to the Course Panel; and

(d) keep assessments and examinations conducted in the relevant subject under constant review and make recommendations to the Course Panel

(5) The functions of **the Research and Evaluation Panel** shall be to

(a) initiate and guide appropriate research projects;

(b) keep the need for curriculum- based research and evaluation under constant review; and

(c) give general guidance and support to the curriculum-based research and evaluation programmes of the Institute.

Source: **The Kenya Institute of Education Order, 2010**

APPENDIX TWO: Interview Guide for Key Stakeholders

A) Personal Information

What is your position in the Ministry / Institution?
When were you appointed to your current position?

B) Experiences with / Perceptions of impact of ICT Policy on Teacher Education

1. A) Are you aware of any ICT-based pre-service / in service teacher education programmes since 1997 that have involved the use of
    a. Radio
    b. TV
    c. audio-tapes
    d. Any other?

    B) Who initiated it? Is there direct involvement by the Ministry of Education? Was the curriculum approved by the Ministry of Education? Is it directly guided by govemment? policy?

2. A) Are you aware of any ICT-based pre-service / in service teacher education programmes since 1997 that have involved the use of
    a. Computers
    b. CD-ROM
    c. Internet
    d. Mobile Technologies

    B) Who initiated it? Is there direct involvement by the Ministry of Education? Was the curriculum approved by the Ministry of Education? Is it directly guided by govemment? policy?

3. Are there any moves towards ICT integration in other subjects in the teacher education curriculum? What factors have driven these moves?

4. Are there any programmes that prepare the teacher educators /lecturers to be better users of ICT? What factors have driven these moves?

5. Are there any ICT-based professional development programmes that target the teacher educators? What factors have driven these programmes?

6. Do you think these programmes are a result of direct policy intervention by the govemment?

7. Is it a requirement of the Ministry that each teacher education institution develops an ICT policy?
    a. Has this been implemented?
    b. If Yes, with what result?
    c. If no, what is the likely outcome?
8. Do you feel that issues around teacher education have been adequately addressed by the National ICT Policy in place?

9. To what extent has govemment policy guided ICT use in teacher education in Kenya in terms of:
    a. Technologies
    b. Curriculum
    c. Learning resources
    d. Mode of study
    e. Assessment
    f. Qualification and Certification
10. What would you say are some of the implications for future national and institutional ICT policy development for Teacher Education in Kenya?

APPENDIX THREE: Interview Guide for the Case Study

1. Why were computers and internet connectivity provided to your school?
2. What kind of training have the teachers at your institution undergone?
3. What was the aim of the training programmes for the teachers in your institution?
4. In what form / medium were the training materials delivered to the teachers in your institution?
5. Were the teachers always involved in on-site institution based training?
6. Were there any opportunities for teachers at your institution to share their experiences?
7. How were the teachers in your institution prepared to operationalise the e-schools concept?
8. Have the teachers in your institution participated in any ICT supported research and development activities around teacher education?
9. Are you aware of some of the provisions of the national ICT policy with regards to teacher education?
10. Does your institution have an institutional ICT policy/strategy?
11. Do you think the teacher education programme at your institution has been adequately guided by national ICT policies?

APPENDIX FOUR: NEPAD e-schools teacher training schedule

NEPAD - KENYA

CAPACITY BUILDING TRAINING PROGRAMME FOR NEPAD E-SCHOOLS AND ICT IN EDUCATION

@

KENYA TECHNICAL TEACHERS COLLEGE

TIME-TABLE

17TH – 29TH APRIL 2006

DAY/DATE	Hrs	TIME	EVENT	Facilitator/ Presenter
Monday 17th April 2006		4:00 – 5:00 pm 6:30 – 7:30 pm 8:00 – 9:00 pm	↓ **Arrival / Registration** ↓ Supper ↓ Briefing	
Tuesday 18th April, 2006	8	8.00 – 9.00 a.m. 9.00 – 9.30 a.m. 9.30 – 10.30 a.m. **10.30 - 11.00 a.m.** 11:00 – 12 00 p.m. 12:15 – 1:00 p.m. **1.00 – 2.00 p.m.** 2.00 – 3.00 p.m.. 3.00 – 4.00 p.m. **4.00 – 430 p.m.** 4.30 – 5.30 p.m.	↓ Assembling at the Conference center ↓ Needs Assessment ↓ Welcoming Speech ↓ Introduction and Objectives **TEA BREAK** ↓ Introduction to Internet Sending & Receiving E-mails. ↓ Internet services **LUNCH BREAK** Integration of ICT in Education ↓ Principles of e-Learning **TEA BREAK** ↓ e-Learning Platform	
Wednesday 19th April, 2006		8.00 – 10.00 a.m. 10.00 – 10.30 a.m.	↓ Review of Ms Word ↓ Welcoming Speech ↓ Introduction and Objectives ↓ Official Opening **LUNCH BREAK**	↓

1

		1.00 - 2.00 p.m. 2.00 – 3:30 p.m.	➧ Internet: o Application, evaluation of materials, references, etc. o Etiquette **TEA BREAK** ➧ Review Ms Excel		2
	8	**3.30 – 4.00 p.m.** 4.00 – 5:30 p.m.			
Thursday 20th April, 2006		8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m. – 1.00p.m. **1.00 – 2.00 p.m.** 2:00 – 4: 00 p.m. **4.00 – 4.30 p.m.**	➧ Universal Curriculum **TEA BREAK** ➧ Customization of Universal Curriculum **LUNCH BREAK** ➧ Literacy Redefined (Case Study 1.) **TEA BREAK**		
	8	4.30 – 6.00 p.m.	➧ Review Power Point		
Friday 21stApril, 2006		8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m.-12.30 p.m. **1.00 – 2.00 p.m.** 2.00 – 4.00 p.m.	➧ Literacy Redefined (Case Study 2) **TEA BREAK** ➧ E- Learning **LUNCH BREAK** ➧ Approval and Regulation of e-Content **TEA BREAK**		
	8	**4.00 – 4.30 p.m.** 4.30 – 5: 30 pm	➧ Ms Access		
Monday 24th April, 2006		8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m.-10.00 p.m. 11.30 – 1.00 p.m. **1.00– 2.00 p.m.**	➧ Internet Research Strategies **TEA BREAK** ➧ Problem Based Learning (PBL) Presentation of case studies **LUNCH BREAK** ➧ Strategies of Integration of ICT in the classroom		
	8	2.00. – 4.00 p.m. **4.00 – 4.30 p.m.** 4.30 – 5.30 p.m.	**TEA BREAK** Strategies of Integration of ICT in the classroom		
Tuesday 25th April, 2006		8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m. –1.00 p.m. **1.00 – 2.00 p.m.** 2.00 – 4.00 p.m. **4.00 – 4.30 p.m.** 4.30 – 5.30 p.m.	➧ Development of ICT Integration tools **TEA BREAK** ➧ Practical Approach to PBL **LUNCH BREAK** ➧ Classroom Management **TEA BREAK** ➧ Classroom Management		
	8				

Wednesday 26th April, 2006	8	8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m. –1.00 p.m. **1.00 – 2.00 p.m.** 2.00 – 3.00 p.m. 3:00- 4:00 p.m. **4.00 – 4.30 p.m.** 4.30 – 5.30 p.m.	➧ A Visit to KCCT –Tele-Posta Towers **TEA BREAK** ➧ Strategies of Integration of ICT in classroom. **LUNCH BREAK** ➧ Presentation of a Case study (ICT Integration in a classroom) ➧ Development of ICT Integration Tools **TEA BREAK** Development of ICT Integration Tools		3
Thursday 27th April, 2006	8	8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m. – 1.00 p.m. **1.00 – 2.00 p.m.** 2.00 –4.00 p.m. **4.00 – 4.30 p.m.** 4.30 – 5.30 p.m.	➧ Application of e-tools (Multimedia tools integration) **TEA BREAK** ➧ ICT Policy Making **LUNCH BREAK** ➧ ICT Policy Practical & Feedback. **TEA BREAK** ICT Policy Practical & Feedback		
Friday 28th April, 2006	8	8.00 – 10.00 a.m. **10.00 – 10.30 a.m.** 10.30 a.m. – 11.30 p.m. 11:30 a.m. - 1:00 p.m. **1:00 – 2.00 p.m.** 2.00 – 2.30 p.m. 2:30 -3:30 p.m.	➧ Digital Libraries **TEA BREAK** ➧ Policy for Integration of ICT in Education ➧ Internet Browsing **LUNCH BREAK** ➧ Evaluation by participants ➧ Closing Ceremony ➧ Cocktail Party		
Saturday 29th April, 2006			➧ **DEPARTURE**		

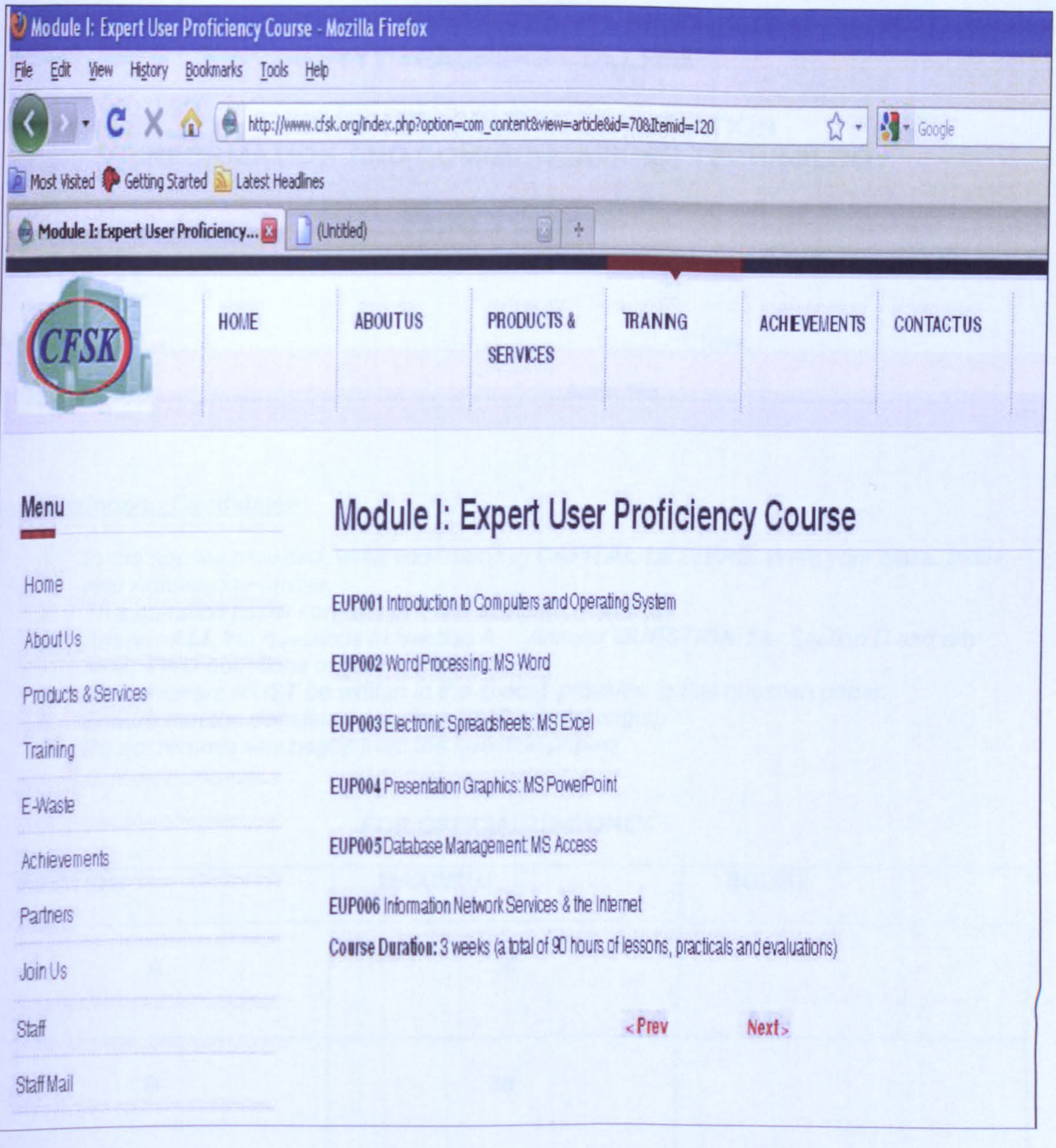
APPENDIX FIVE: Summary of ICT curriculum for pre-service PTTC student teachers

COURSE SUMMARY AND TIME ALLOCATION

YEAR ONE

TOPIC NO.	TOPIC	SUB-TOPIC	TIME ALLOCATION HOURS
1.0	INTRODUCTON TO COMPUTERS	- Definition of a computer - Parts of a computer - Historical development of computers - Classification of computers - Importance of a computer - Areas were computer are used - Safety precautions and practices in a computer laboratory - Hands on skills	5
2.0	COMPUTER SYSTEM	- Structure of a computer systems - Functional organization of the elements of a computer system - Input devices - Central Processing Unit (CPU) - Output devices - Secondary storage Devices and Media - Basic computer set-up and cabling - Classification of software - Criteria for selecting a computer system (specification)	5
3.0	OPERATING SYSTEMS	- Definition of an operating system - Functions of an operating system - Types of operating systems - Organization of Information using an operating system - File management using an operating system - Devices under operating system control	8
		- Installation and configuration of an operating system.	
4.0	MAINTAINING AND UPGRADING A COMPUTER	- Connection of basic components of a computer - Identifying various parts of the system unit - Hardware installation and configuration - Software installation - Troubleshooting - Computer servicing	5
5.0	APPLICATION AREAS OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)	- Definition of ICT - Elements of ICT - Application areas of ICT - Multimedia computer system - Educational software - Special Needs Education (SNE) devices - Impact of ICT on society	4
6.0	APPLICATION PACKAGES	- Definition of an application package - Types of application packages - Installation of application software - Selection of relevant application package	3
7.0	WORD PROCESSING	-Definition of word processing -Purpose of word processing -Using a word processing software -Editing and formatting a document -Creating and editing a table -Creating, sorting and updating a mail merge document -Preparing a document for printing -Importing and inserting object -Practical task/tasks.	22
		YEAR TWO	
12.5	SPREADSHEET	- Definition of spreadsheet - components of a spreadsheet - Uses of a spreadsheet - Creating a worksheet/workbook - Cell Data Types - Cell referencing - Basic functions and Formulae	

APPENDIX SIX: CFSK teacher training curriculum



APPENDIX SEVEN: Theory and Practical mid-course examination for PTTCs

YYY TEACHERS COLLEGE

THEORY MID–COURSE EXAMINATION

INFORMATION AND COMMUNICATIONS TECHNOLOGY

Paper 1 (Theory)

Time: 2hrs Date: July, 2005

Name. .... Class.....

Index No. .....Adm. No.....

Instructions to Candidates

1. *In the spaces provided, write your name in **CAPITAL LETTERS**. Write your class, Index and Admission number.*
2. *This question paper consists of **TWO** sections, **A** and **B***
3. *Answer **ALL** the questions in Section A. Answer **QUESTION 1** in Section B and any other **TWO** questions of your choice.*
4. ***ALL** answers **MUST** be written in the spaces provided in this question paper.*
5. *Ensure that the question paper has **FIVE** printed pages.*
6. *Do not remove any pages from the question papers.*

FOR OFFICIAL USE ONLY

SECTION	MAXIMUM	SCORE
A	30	
B	30	
TOTAL SCORE	60	

SECTION A (30 MARKS)

1. With examples, name any **three** methods used to classify computers. **(3 mks)**

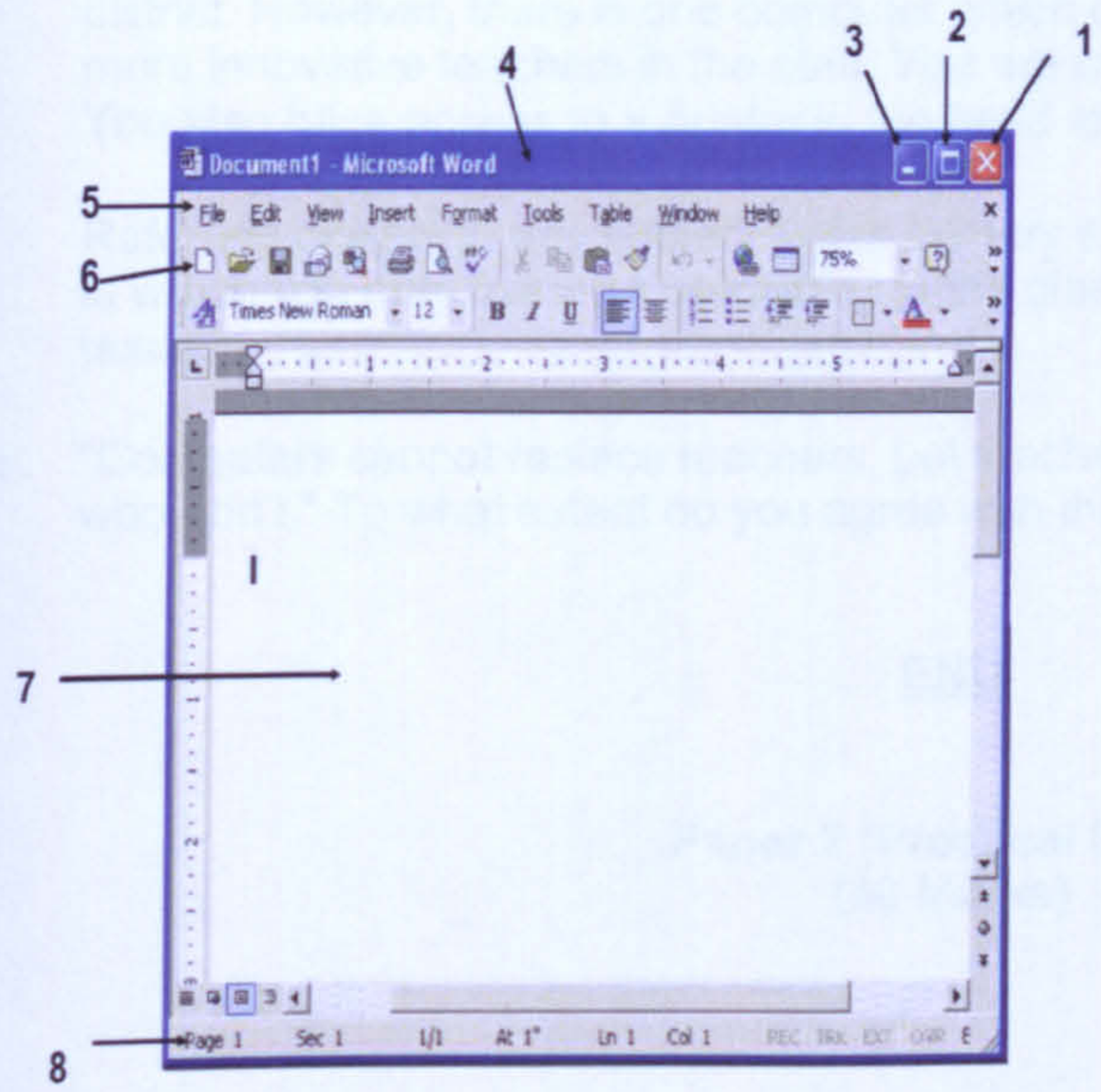
2. Giving an example for each, state any **three** categories of input devices. **(3mks)**

3. Explain the functions of the following components of the CPU. **(3mks)**
   a) The Control Unit
   b) Arithmetic and Logic Unit
   c) The main memory

4. Giving examples, distinguish between **fixed** and **removable** storage **(4mks)**

5. a) What is an operating system? **(1mk)**
   b) With examples, describe the **three** criteria used to classify operating systems **(3mks)**

6. Name the parts of the window below



1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

7. Distinguish between **Windows** and **a window**. **(2mks)**

8. a) What is e-learning? **(2mks)**
   b) What in your opinion are the advantages of e- learning? Give any **two**. **(2mks)**

9. a) Define ICT **(1mk)**
   b) Describe the **two** elements of ICT **(2mks)**

SECTION B (30 MARKS)

Answer **three** questions in this section. **Question 1** is compulsory. All questions carry equal marks.

1. You are the secretary of the School Management committee, Nyandarua Primary School. The school was recently connected to the power line and would like to purchase computers for use in school management. Members of the PTA are reluctant to support the project and do not see why their aging typewriter should no longer be useful.

   Referring closely to what you have learnt in your ICT course at the Teacher Training College, advise the stakeholders on the **advantages** and **disadvantages** of using computers as a tool for school management.

2. Discuss any **five** safety precautions and practices that you would enforce in a computer laboratory in your school.

3. "Word processing packages are useful for language development." Describe any **five** ways in which you would use **Microsoft Word** to teach English more effectively.

4. You have been deployed to teach in an under-resourced primary school in your home district. However, there is one computer which can be carried to class for use by the more innovative teachers in the staff. You are one such teacher with a class of 40 pupils. You also have access to a printer in the head teacher's office.

   Referring closely to any subject in the primary school curriculum, describe any **five** ways in which you may use **one computer** in the classroom to help improve the way you teach.

5. "Computers cannot replace teachers, but teachers who use computers will replace those who don't." To what extent do you agree with this statement?

END

Paper 2 (Practical Exam)
(40 Marks)

Answer all the questions

1) Create a folder called **NAIROBI** on **The Desktop. (2mks)**
2) Create **three** sub- folders in **NAIROBI** and name them as follows: **NAKURU, KERICHO, MOMBASA. (3mks)**
3) Open the document **TEA PLANTING** from **C: \ MIDCOURSE \ ICT. (2mks)**
4) Select the text **"!!Insert Text!!"** and format it as follows. **(5mks)**
   - Font –Monotype Corsiva
   - Font size - 20
   - Alignment –Centre
   - Font style –Bold
5) Change the colour of the text **TEA** everywhere it occurs to **Red. (2mks)**

6) Insert a relevant clipart picture after the paragraph that begins "……." **(2mks)**
7) Select the paragraph that begins "……" and change its line spacing to double. **(2mks)**
8) Type the following text as a last paragraph of the document and format as shown. **(10mks)**

(Insert Text and instructions worth 10mks)

9) Save the document in the sub-folder **KERICHO** and close the document.**(2mks)**
10) Table **(10 mks)**

APPENDIX EIGHT: A summary of some ICT policy statements relevant to teacher education 1997-2007

1.	**1997**	Kenya Posts and Telecommunications Act	Government of Kenya
No mention of teacher education or training			

2.	**1998**	Master Plan on Education and Training 1997 - 2010	Government of Kenya
Was not available to the researcher			

3.	**1998**	The Kenya Communications Act	Government of Kenya
No mention of teacher education or training			

4.	**1999**	Totally Integrated Quality Education and Training (TIQET) - Report of the Commission of Inquiry into the Education System of Kenya	Republic of Kenya
Flexible learning programmes (should) be created in learning institutions to cater for lifelong education programmes of all ages. p38 Distance learning (should) be used as a vehicle for promoting the culture of lifelong learning nationwide by establishing continuing education programmes in those areas of Kenya where such programmes have not been initiated. p39			

5.	**1999**	National Poverty Eradication Plan 1999-2015	Office of the President; Republic of Kenya
...Policy and management initiatives will include: a primary school curriculum focused on key universal skills; more effective and decentralised primary school management , and a teaching profession committed to leadership in the search for broad based development (Republic of Kenya,1999b:pxiii)			

6.	**June 2003**	Economic Recovery Strategy for Wealth and Employment Creation 2003-2007	Government of Kenya

'Information and Communication Technology (ICT) is important to the realisation of the required improvement in productivity and empowerment of the citizenry' p55

'The government intends to invest in adequate ICT education and training. In this context, the government will streamline the education curriculum to incorporate IT studies to develop appropriate skill requirements' p55

7.	**Jan 2004**	ICT Primary Teacher Education Syllabus	Kenya Institute of Education

'The objectives in the teacher training syllabus are to teach ICT literacy, e.g. basic word processing, spreadsheet and database applications.'( )

'The syllabus is intended to equip the learner with general understanding of ICT skills, tools and devices that may be used to enhance teaching and learning of various subjects in their curriculum' pg 209.

8.	**March 2004**	E-Government Strategy: The Strategic Framework, Administrative Structure, Training Requirements and Standardization Framework	Office of the President; Republic of Kenya

'As part of the training strategy, and in order to ensure a continued pool of IT knowledge base within government, all training programmes undertaken by government personnel will have an IT component' Pg 21

9.	**Sept 2004**	ICT Scoping Study	Ministry of Education, Science and Technology: Republic of Kenya

A plan needs to be drawn up to develop ICT based pedagogical materials in order that the benefits of IT can be felt in each subject area of the curriculum p58

10.	**2005**	Sessional Paper No 1 of 2005: A Policy Framework for Education, Training and Research	Ministry of Education, Science and Technology: Republic of Kenya

'The government appreciates and recognizes that an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy' p79

'Information and Communication Technology have a direct role to play in education...if appropriately used, ICT can bring many benefits to the classroom and the education and training process in general.'p80

'(ICT) will provide new opportunities for teaching and learning including offering opportunity for more student centred teaching, opportunity to reach more learners, greater opportunity for teacher-to-teacher, and student-to-student communication and collaboration, greater opportunities for multiple technologies delivered by teachers, creating greater enthusiasm for learning amongst students and offering access to a wider range of courses.'p80

'The Ministry's policy on ICT is to integrate ICT education and training into education and training systems in order to prepare the learners, and staff of today for the Kenyan economy of tomorrow and therefore enhance the nation's ICT skills.'p80

'(The government will) work with stakeholders to ensure implementation of the New Partnership for Africa's Development (NEPAD) e-school initiative under the NEPAD e-Africa Commission.' p81

'(The government will) promote expanded use of ICT as a tool for effective management, research and development, at all educational levels and use the internet for education, training and research'p81

'(The government will) provide computers to primary, secondary schools and teacher training colleges'p81

'(The government will) provide teachers and education sector managers with access to information and tools to enable them to better deliver educational services.'p83

'(The government will) promote ODE and virtual institutions, particularly in higher education and training.'p83

11.	**July 2005**	Kenya Education Sector Support Programme 2005 – 2010 (KESSP)	Ministry of Education, Science and Technology: Republic of Kenya

It is important that Kenya's teachers be exposed to contemporary and relevant experiences in using modern methods and media, including ICTs in curriculum delivery p130

The Ministry's policy on ICT is to integrate ICT education and training into education and training systems in order to prepare the learners and staff of today for the Kenyan economy of tomorrow through the enhancement of the ICT skills p156

The ICT investment programme will employ the following strategies to address key policy issues:

- Supporting the development of digital content to be provided to educational institutions
- Supporting teacher training colleges and universities in development and production of ICT teachers
- Supporting research and development of ICT in education

The performance indicators projected for these strategies are:

- Digital content
  - Availability of e-learning materials
  - Education portal for distribution of e-learning materials

- ICT teacher development
  - ICT literate workforce; number of secondary and primary school teachers trained
  - Provision of trained teachers in collaboration with TSC and Teacher Training Colleges

- Research and development
  - Innovations and sustainable models; innovation reports; research materials
  - Number of documented innovations
  - Products for showcase or replication(Pgs 173 – 179)

12.	**August 2005**	Draft National ICT Strategy for Education and Training	Ministry of Education, Science and Technology: Republic of Kenya

A) ICT integration in Education
Strategic Objectives

a) To establish model institutions that will be used to demonstrate integration of ICT to teaching and learning
b) To train at least 20 master integrators to support integration at the national and district levels
c) To train teachers on integration techniques and sensitize education managers

		on ICT integration **Expected Outcomes** a) An increased rate of educational institutions that have integrated ICT in the delivery of education curricula b) Improved performance in education and examinations c) Enhanced transition rates at all levels of education **B) Training (Capacity Building and Professional Development)** The teaching staff force of 197,000 primary school teachers and 38,000 secondary school teachers will be trained in ICT literacy and integration **Strategic Objectives** a) To build basic capacity in ICT skills for all players in the education sector b) To build capacity of education sector managers to use ICT tools to enable better delivery of educational services c) To sensitize all stakeholders on ICT integration d) To build capacity for use and maintenance of ICT equipment *Teachers/ Trainers* e) To build capacity for at least one teacher in each school to teach ICT, support ICT literacy and integration and basic maintenance of ICT equipment. f) To build the capacity of universities and colleges to equip teachers with ICT skills up to certificate, diploma and degree level. *Curriculum and content developers*: g) To develop sufficient capacity for curriculum and content developers to appropriately infuse ICT in the curriculum and develop digital content to support the curriculum. *Universities and colleges*: h) To build the capacity of TIVET trainers and university lecturers, to promote the development, adoption and use of ICT tools of production in all sectors of the economy. **Expected Outcomes** a) All levels of the education sector will be ICT-literate. b) Education sector personnel will have the capacity to improve the delivery of services and accountability and to make the information flow and data processing more efficient. This will improve information sharing and decision-making. c) Administrators will have the capacity to use appropriate tools to create a less cumbersome bureaucracy and deliver services more efficiently. d) Education managers will be able to support ICT-integration in the institutions. e) The ministry will have qualified technicians to take care of the maintenance of the ICT equipment
13.	2005	ICT Teaching Guide for Primary Teachers Training Colleges	Kenya Institute of Education

'The teacher educator and the pre-service teacher are both expected to continually develop their pedagogical use of ICT to support learning, teaching and curriculum development, including assessment of learners and evaluation of teaching' p(v)

'(The teacher educator and the pre-service teacher) should:

- Demonstrate understanding of the opportunities and implications of the uses of ICT tools for learning and teaching in the context of the curriculum
- Plan, implement and manage learning and teaching in ICT-rich environments
- Assess and evaluate learning and teaching in ICT-rich environments.' p(viii)

	March 2006	National ICT Policy	Ministry of Information and Communications: Republic of Kenya

Human Resource Development
The Government recognizes the role played by the various institutions providing ICT education and training. However, there is need to strengthen and streamline the training through:

Promoting ICT in education at primary, secondary, tertiary and community levels by developing ICT curricula and ensuring that teachers/trainers possess the requisite skills;
Setting up a framework for evaluating and certifying ICT training programmes;
(p5)
The realization of the policy objectives will depend on the availability and adequacy of skilled human resource capacity. The Government will support the creation of the necessary capacity by:

Integrating IT subjects in the curriculum at all levels of education;
Establishing educational networks for sharing educational resources and promoting e-learning at all levels;
Establishing the establishment of ICT Centres of Excellence;
Encouraging and supporting IT training for decision-makers, community and civil society leaders;
Creating opportunities and providing assistance for the disadvantaged, people with special needs, women and the youth to acquire IT skills; and
Enhancing capacity for research and development in IT.
(p14)

Promote the development of e-content to address the educational needs of primary, secondary and tertiary institutions;
Create awareness of the opportunities offered by ICT as an educational tool to the education sector;
Facilitate sharing of e-learning resources between institutions;
Promote distance education and virtual institutions, particularly higher education and training;
Integrate e-learning resources with other existing resources.
(p12)

14.	June 2006	National ICT Strategy for Education and Training	Ministry of Education: Republic of Kenya

A) ICT integration in Education
Strategic Objectives

- To establish model institutions that will be used to demonstrate integration of ICT to teaching and learning
- To train at least 20 master integrators to support integration at the national and district levels.
- To train teachers on integration techniques and sensitize education managers on ICT integration

Expected Outcomes

- An increased rate of educational institutions that have integrated ICT n the delivery of education curricula
- Improved performance in education and examinations
- Enhanced transition rates at all levels of education

(p10)

B) Training (Capacity Building and Professional Development)
The teaching staff force of 197,000 primary school teachers and 38,000 secondary school teachers will be trained in ICT literacy and integration

Strategic Objectives

- To build basic capacity in ICT skills for all players in the education sector
- To build capacity of education sector managers to use ICT tools to enable better delivery of educational services
- To sensitize all stakeholders on ICT integration
- To build capacity for use and maintenance of ICT equipment

Teachers/ Trainers

- To build capacity for at least one teacher in each school to teach ICT, support ICT literacy and integration and basic maintenance of ICT equipment.
- To build the capacity of universities and colleges to equip teachers with ICT skills up to certificate, diploma and degree level.

Curriculum and content developers:

- To develop sufficient capacity for curriculum and content developers to appropriately infuse ICT in the curriculum and develop digital content to support the curriculum.

Universities and colleges:

- To build the capacity of TIVET trainers and university lecturers, to promote the development, adoption and use of ICT tools of production in all sectors of the economy.

Expected Outcomes

- All levels of the education sector will be ICT-literate.
- Education sector personnel will have the capacity to improve the delivery of services and accountability and to make the information flow and data processing more efficient. This will improve information sharing and

decision-making.

- Administrators will have the capacity to use appropriate tools to create a less cumbersome bureaucracy and deliver services more efficiently.
- Education managers will be able to support ICT-integration in the institutions.
- The ministry will have qualified technicians to take care of the maintenance of the ICT equipment

(p11)

15.	2006	Ministry of Education Strategic Plan 2006 – 2011	Ministry of Education: Republic of Kenya

- 'ICT has been integrated in the syllabus for pre-service teacher training' p26
- 'Digitization (of the curriculum) is going on under KESSEP'p26

16.	**Jan 2004**	ICT Primary Teacher Education Syllabus	Kenya Institute of Education

'The objectives in the teacher training syllabus are to teach ICT literacy, e.g. basic word processing, spreadsheet and database applications.'( )

'The syllabus is intended to equip the learner with general understanding of ICT skills, tools and devices that may be used to enhance teaching and learning of various subjects in their curriculum' pg 209.

17.	**March 2004**	E-Government Strategy: The Strategic Framework, Administrative Structure, Training Requirements and Standardization Framework	Office of the President; Republic of Kenya

'As part of the training strategy, and in order to ensure a continued pool of IT knowledge base within government, all training programmes undertaken by government personnel will have an IT component' Pg 21

18.	**Sept 2004**	ICT Scoping Study	Ministry of Education, Science and Technology: Republic of Kenya

A plan needs to be drawn up to develop ICT based pedagogical materials in order that the benefits of IT can be felt in each subject area of the curriculum p58

APPENDIX NINE: Letter to Principals seeking access

To
The Principal
.....
....., *Kenya*

Date: .....

REQUEST TO ACCESS YOUR INSTITUTION TO CONDUCT RESEARCH

I wish to request you to allow me to conduct research in your institution. I am a Lecturer in one of the TTCs in Kenya, and I am currently on a 3-year Study Leave to undertake a full-time PhD degree programme at The Open University, Milton Keynes, UK. My PhD topic area is ***ICTs, National Policies and the Development of Teacher Education in Kenya***. The study aims to establish the extent to which ICT policies have influenced teacher education programmes in Kenya in the last 10 years.

The data for the study will be drawn from an analysis of the national and institutional ICT policy documents, and interviews. In your institution, I wish to interview the head of the institution, the Chairman of the Board of Governors, the director of studies, the head of ICT Department and any two teachers representing different subject groupings. The interviews will last no more than 45 minutes and will be recorded.

I will also seek to access any documents that will be relevant to the study including; the institutional ICT policy document, teacher training curriculum/kit/syllabus, project reports, documentaries and ICT departmental reports. The information obtained during my visit to your institution will remain strictly confidential and will be used solely for the purposes of the study. The identities of the respondents and the institutions from which they come will be coded and therefore your anonymity and that of your institution will be assured throughout the study.

Copies of the Research Authorization Letter and Research Clearance Permit from the Ministry of Science and Technology are hereby attached.

Betty Obura Ogange
Research Student

Centre for Research in Education
and Educational Technology (CREET)
The Open University
Stuart Hall, Level 3
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Milton Keynes, MK7 6AA
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Tel: +44 (0) 1908 655 307
Mobile: +44 (0)7960 138 733
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OYUGIS
Kenya
Mobile: +254 (0) 736 155 293
+254 (0) 722 348 693
E-mail: ogange@yahoo.com

APPENDIX TEN : Letter to respondents seeking consent

To

Date: .....

REQUEST FOR CONSENT TO BE INTERVIEWED

I wish to request you to allow me to interview you as one of the respondents in a study that I am carrying out. I am a Lecturer in one of the TTCs in Kenya, and I am currently on a 3-year Study Leave to undertake a full-time PhD degree programme at The Open University, Milton Keynes, UK. My PhD topic area is ***ICTs, National Policies and the Development of Teacher Education in Kenya***. The study aims to establish the extent to which ICT policies have influenced teacher education programmes in Kenya in the last 10 years.

The data for the study will be drawn from an analysis of the national and institutional ICT policy documents, and interviews. You have been identified as one of the participants in the interviews, which will last no more than 45 minutes and will be recorded.

The information that you will provide during the interview will remain strictly confidential and will be used solely for the purposes of the study. The identities of the respondents and the institutions from which they come will be coded and therefore your anonymity and that of your institution will be assured throughout the study.

I do hope to receive your consent soon by way of e-mail or text message. However, should you change your mind regarding your participation in the interview after giving your consent, you are free to pull out.

Copies of the Research Authorization Letter and Research Clearance Permit from the Ministry of Science and Technology are hereby attached.

Betty Obura Ogange
Research Student

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APPENDIX ELEVEN: NEPAD training certificate

NEPAD - KENYA

REPUBLIC OF KENYA

MINISTRY OF EDUCATION

This is to certify that

has attended

CAPACITY BUILDING TRAINING PROGRAMME FOR NEPAD e-SCHOOLS AND ICT IN EDUCATION

Conducted by

KENYA TECHNICAL TEACHERS COLLEGE

From 17th April to 28th April 2006

Date: 28th April 2006

CHARLES I. IMBALI
Chief Principal
KTTC

MARY J. MMAYI
Country Liaison Officer
NEPAD e-SCHOOLS
KENYA

APPENDIX TWELVE: Research Permit

PAGE 2

THIS IS TO CERTIFY THAT:

Prof/Dr/Mr/Mrs/Miss BEATRICE OBURA OGANGE

of (Address) THE OPEN UNIVERSITY, UNITED KINGDOM

has been permitted to conduct research in MINISTRY OF EDUCATION OFFICES ALL District, ALL Province,

on the topic ICT's NATIONAL POLICIES AND DEVELOPMENT OF TEACHER EDUCATION IN KENYA

for a period ending 30TH OCTOBER, 2009

Applicant's Signature

PAGE 3

Research Permit No. MOST 13/001/37C 839

Date of issue 18.12.2007

Fee received SHS.1000.00

...SECRETARY
...STRY OF EDUCATION
SCIENCE AND TECHNOLOGY
M.O.ONDIEKI

FOR: Permanent Secretary
Ministry of
Science and Technology

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

GPK 6035—3m—10/2003

(CONDITIONS—see back page)

APPENDIX THIRTEEN: List of Respondents

1) KEY STAKEHOLDERS (K)

CODE NO	POSITION
K1	Senior Education Officer, Teacher Education Division Ministry of Education
K2	Head of Education and Media Services
K3	Head of Teacher Education
K4	eLearning Department
K5	Head of Electronics and emerging Media
K6	eLearning Officer
K7	Teacher Education Department
K8	Monitoring and Evaluation Officer
K9	Officer , Communications Commission of Kenya
K10	Deputy Director NGO
K11	Lecturer Public University
K12	Lecturer Diploma Teachers College
K13	Lecturer Polytechnic
K14	Lecturer, Public University
K15	Chairman, Computer Science Department, Public University
K16	Lecturer, Teacher Training College
K17	Coordinator, Non Governmental Organisation
K18	Teacher Education Division, Ministry of Education
K19	Lecturer Teacher Training College
K20	Former Principal, Teacher Training College
K21	Lecturer, Business Studies, TTC
K22	Director ICT Services, Public University
K23	Programme Officer, ICT Trust Fund
K24	Retired Assistant Director, KIE
K25	Retired Section Head, KIE
K26	Principal, Teacher Training College

2) CASE 1 – NEPAD e-Schools Programme

CODE NO	**POSITION**
N1	Programme Manager NEPAD Secretariat
N2	Member National Implementation Team, NEPAD e-schools programme
N3	Trainer NEPAD e-schools Teacher Training Programme
N4	Deputy Principal 1.1High School
N5	Member, Board of Governors 1.1High School
N6	Director of Studies / Teacher of English 1.1High School
N7	Teacher, Head of ICT / Teacher of Maths 1.1High School
N8	Teacher, Biology 1.1High School
N9	Teacher, Chemistry 1.1High School
N10	Principal 1.2 High School
N11	Chairman, Board of Governors 1.2 High School
N12	Director of studies/ Physics teacher 1.2 High School
N13	Head of ICT / Maths / Physics teacher 1.2 High School
N14	Kiswahili teacher 1.2 High School
N15	Computer Studies teacher 1.2 High School
N16	Biology teacher 1.2 High School

3) CASE 2 – Primary Teacher Training Colleges

CODE NO	POSITION AND INSTITUTION
P1	Secretary Kenya Teacher Training Colleges Principals Association
P2	Principal / Lecturer of Business Studies 2.1TTC
P3	Chairman, Board of Governors 2.1Teachers College
P4	Dean of Curriculum/ Lecturer of CRE 2.1Teachers College
P5	Head of Learning Resource Centre 2.1Teachers College
P6	Head of ICT 2.1Teachers College
P7	Lecturer of English 2.1Teachers College
P8	Lecturer of Maths 2.1Teachers College
P9	Principal 2.2 Teachers College
P10	Chairman, Board of Governors 2.2 Teachers College
P11	Dean of Curriculum 2.2 Teachers College
P12	Head of Learning Resource Centre 2.2 Teachers College
P13	Head of ICT 2.2 Teachers College
P14	Lecturer 1 – CRE teacher 2.2 Teachers College
P15	Lecturer 2 – Science teacher 2.2 Teachers College

4) CASE 3 – Computers for Schools Kenya (CFSK)

CODE NO	POSITION AND INSTITUTION
C1	Deputy Director Computers for Schools Kenya (CFSK)
C2	Research, Monitoring and Evaluation Officer, CFSK
C3	Curriculum Officer CFSK
C4	Director, CFSK
C5	Principal / Teacher of History 3.1 Secondary School
C6	Chairman, Board of Governors 3.1 Secondary School
C7	Teacher, Computer Studies 3.1 Secondary School
C8	Teacher, Chemistry and Biology 3.1 Secondary School
C9	Teacher, Kiswahili and Geography 3.1 Secondary School
C10	Teacher, Physics 3.1 Secondary School
C11	Principal 3.2 Secondary School
C12	Chairman, Board of Governors 3.2 Secondary School
C13	Director of studies 3.2 Secondary School
C14	Head of ICT 3.2 Secondary School
C15	Teacher 1 Computer Studies teacher 3.2 Secondary School
C16	Teacher 2 Teacher of English 3.2 Secondary School
C17	Regional centre manager